OCTOBER

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

1922

Ten Years to Life—*Hartzell*

Removable Appliances and Fixed Principles—*Jackson*

The Mechanics of Spherical Articulation —*Needles*

Dental Surgery in Arthritis—*Eusterman*

Mouth Hygiene as Taught and Practiced in Public Schools—*Smith*

The Los Angeles Meeting—*Boyd*

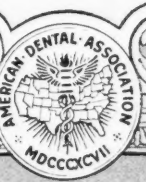
National Dental Meeting—*Smith*

Codification of Dental Hygienists' Laws

Model Law Regulating Practice of Dental Hygiene

New Code of Ethics

What About Fee-Splitting?—*Editorial*



TWENTY-FIVE CENTS

CONTENTS

Local Committee with President and Secretary of the American Dental Association at the Los Angeles Meeting ..... Frontispiece

ORIGINAL COMMUNICATIONS

Ten Years To Life.
By Thomas B. Hartzell, M.D., D.M.D. 831

The Field of the Removable Appliances and the Blending of the Removable and Fixed Principles.
By Victor Hugo Jackson, M.A., M.D., D.D.S., F.A.C.D. 841

The Mechanics of Spherical Articulation.
By John Walter Needles, A.M., M.D., D.D.S. 866

Dental Surgery in Arthritis.
By Matthew F. Eusterman, D.D.S. 882

Mouth Hygiene as Taught and Practiced in the Peoria Public Schools.
By H. C. Carroll Smith, D.D.S. 884

The Los Angeles Meeting.
By Bert Boyd, D.D.S. 892

National Dental Meeting.
By E. S. Smith, D.D.S. 895

Codification of Dental Hygienists' Laws 901

Draft of Law Regulating Practice of Dental Hygiene 902

Reminiscences of Forty-five Years in Dentistry.
By C. N. Johnson, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D. 904

Code of Ethics of the American Dental Association 908

EDITORIAL DEPARTMENT

What About Fee-Splitting? 909

Waldo Elias Boardman (In Memoriam) 912

Annual Index of Periodical Literature, 1921 913

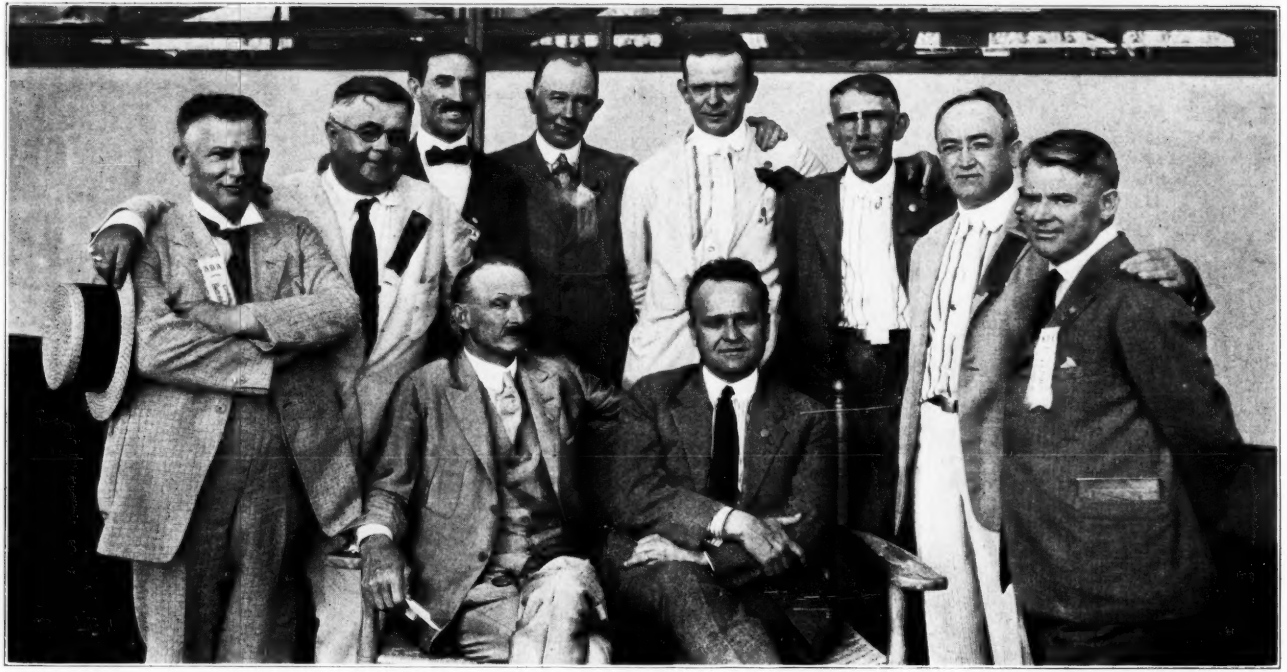
ANNOUNCEMENTS

Calendar of Meetings (National, State, Examining Boards).—Tennessee State Dental Association.—Minnesota State Dental Association.—Indiana State Board Meeting.—Maryland Board of Dental Examiners.—New Jersey Board of Examiners.—Connecticut Dental Commission.—Marquette University Dental School Alumni Meeting.—American Association of Oral and Plastic Surgeons.—The Fourth Annual Report of the Department of Dental Hygiene.—American Dental Golf Association.—Dental Corps Orders from War Department.—New Book Received for the Library of the Journal of the American Dental Association 914-918

ADVERTISING DEPARTMENT

Index to Guaranteed Advertisements A-69

Classified Section A-64, A-65



Lewis E. Ford, J. Franklyn Cook, Bert Boyd, Charles M. Benbrook, J. Elton Lang, Charles C. Noble, W. E. Sibley, Charles E. Rice
Thomas B. Hartzell, President; Otto U. King, Secretary

LOCAL COMMITTEE WITH PRESIDENT AND SECRETARY OF THE AMERICAN DENTAL ASSOCIATION AT THE LOS ANGELES MEETING

LOCAL COMMITTEE WITH PRESIDENT AND SECRETARY OF THE AMERICAN DENTAL ASSOCIATION AT THE LOS ANGELES MEETING

THE JOURNAL
OF THE
American Dental Association

VOL. 9 OCTOBER, 1922 NO. 10

Original Communications

TEN YEARS TO LIFE

By THOMAS B. HARTZELL, M.D., D.M.D., Minneapolis, Minnesota

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

AN EXAMINATION of the literature of the world reveals the fact that here and there through the ages, men have lived to great age. Methuselah is believed to have lived to the ripe old age of 969 years and Metchnikoff, in his book entitled "The Prolongation of Life," cites many cases of men and women who have lived many years more than the allotted four score years and ten. We have constantly brought to the mind the fact that even in our own times there is a considerable number of favored individuals who attain a life of 100 years or more.

Nevertheless, notwithstanding these examples of human beings who have attained great length of days we find that in 1865 the life expectation in our country was only forty years; in 1920 it was 53½ years, while in India, life's expectations is in the twenties; in Italy in the thirties, so that it should be easily possible to add ten more years to the average life.

Our great increase in knowledge of disease and how diseases that affect mankind can be repelled, has constantly tended to increase the number of our years. The profession of dentistry has not been idle in this great campaign, for during the past nine years it has, through its research workers produced evidence and direct information as to the cause of heart, joint and kidney disease, which has enabled the dentist and physician working together to give a marked upward impulse to the life of our people by eradicating local infection to some degree.

Dentistry has also helped to produce the evidence that the secondary anaemias which lessen the oxygen-carrying power

10

THE JOURNAL
OF THE
American Dental Association
VOL. 9 OCTOBER, 1922 NO. 10

Original Communications

TEN YEARS TO LIFE

By THOMAS B. HARTZELL, M.D., D.M.D., Minneapolis, Minnesota

(Read before the American Dental Association, Los Angeles, California, July 17-21, 1922)

AN EXAMINATION of the literature of the world reveals the fact that here and there through the ages, men have lived to great age. Methuselah is believed to have lived to the ripe old age of 969 years and Metchnikoff, in his book entitled "The Prolongation of Life," cites many cases of men and women who have lived many years more than the allotted four score years and ten. We have constantly brought to the mind the fact that even in our own times there is a considerable number of favored individuals who attain a life of 100 years or more.

Nevertheless, notwithstanding these examples of human beings who have attained great length of days we find that in 1865 the life expectation in our country was only forty years; in 1920 it was 53½ years, while in India, life's expectations is in the twenties; in Italy in the thirties, so that it should be easily possible to add ten more years to the average life.

Our great increase in knowledge of disease and how diseases that affect mankind can be repelled, has constantly tended to increase the number of our years. The profession of dentistry has not been idle in this great campaign, for during the past nine years it has, through its research workers produced evidence and direct information as to the cause of heart, joint and kidney disease, which has enabled the dentist and physician working together to give a marked upward impulse to the life of our people by eradicating local infection to some degree.

Dentistry has also helped to produce the evidence that the secondary anaemias which lessen the oxygen-carrying power

of the red blood cells and also decrease the number of them, is dependent upon infectious bacteria growing, for the most part, in the mouth and upon the teeth. By our methods of prophylaxis, a limited control of this life-shortening process has been found.

We must, however, dig deeper into our problem. We must know why, in spite of our increased knowledge of how to control bacterial growth in the individual case, caries which so markedly interferes with nutrition, is nationally on the increase.

The history of dentistry shows conclusively that from its small beginnings to the present time, there has been a steady, upward lifting of dental standards. Viewing the accomplishments of what might now be called a learned profession, we can truthfully maintain that our profession has sought to lengthen life and that the knowledge now being distributed to our members and the general public, if followed, would appreciably increase the vitality and power of every individual. Every department of this great association has contributed its share, and we have seen the evidence of renewed enthusiasm to carry our message of longer and better life to humanity.

As is natural in the beginning of our professional life, the men who made its history and strove hardest, have devoted their time and energy to the replacement of lost masticating organs and the repair of partially destroyed but still salvable teeth. This is good, but we are not keeping abreast with our job for, as Dr. Hyatt (1) says: "There is an average of five cavities in every mouth. This will give us, roughly speaking, over five hundred million cavities in the teeth of all the people in the United States. Allowing one-half hour as being necessary to prepare and fill one cavity, it would require one hundred and twenty-five thousand dentists in the United States, working eight hours a day to do the work now waiting to be done." A gloomy prospect, indeed, particularly when we recall that our statistics show that last year 1432 dentists were admitted to practice while during that same period of time, 1900 ceased to practice.

It seems, therefore, hopeless for the dental profession to ever catch up with the current needs of our people and if we are to continue to do our part in adding years to life, we must do something more than merely repair the ravages of caries for those now living. We must seek out and apply methods which will prevent caries and to grapple with this problem we must teach ourselves and our people how to utilize the knowledge now in our hands which shows conclusively that the way to control this tremendous bacterial destruction of teeth is to make the body untenable for bacterial growth.

Diehl (2) says in his first conclusion that "on a medium containing no organic nitrogen no proteolytic encymes are formed by bacteria." In other words, interfere with bacterial diet and you will markedly interfere with their power to damage and destroy, which points out the great fundamental fact underlying all growth that plant, animal or human life depends upon the right materials to build it. One cannot build a modern fireproof building out of sand or straw. No more can we build a human body which will resist the invasion of bacteria if the materials to create that resistance have been lacking in the food of the individual. If we are to successfully cope with the caries of the teeth of the future we must find and apply a means to prevent caries rather than to hope for a sufficiently great increase in our professional numbers to repair its ravages.

In our enthusiasm to save the teeth themselves, we have sometimes lost sight of the greater thought that teeth are only a part of the human mechanism concerned in the digestion and assimilation of food and that they are subject to infectious processes rendering them a menace to the life of the individual even though they are playing their mechanical part in the nutritional process. This

oversight I concede to be the greatest error into which our profession has ever fallen.

However, dentistry has been useful to man during the entire period of its development with this one exception and our increased knowledge of the fundamental life and habits of bacteria produced in our research laboratories has been able to and is now correcting this fault.

Our knowledge of the destructive germs that have their habitat in the mouth is now fairly complete. We now understand the immediate cause of decay of teeth to be due to the decalcifying acid waste material of a multitude of bacteria, which I desire to call "mould." We understand that to maintain teeth free of caries, it is but necessary to successfully and effectively remove this bacterial mould, or better still, to prevent its growth. We now know that the destruction of the bony sockets is also due to a product of the same harmful bacterial or mould masses which destroy the tooth's foundations with their one other chemical product; that product being a digestive or peptogenic ferment, having the power to dissolve the medium upon which the bacterium finds itself for the moment placed, thus changing the substance of the tissues to a fluid called pus upon which they may support life and growth. We also understand that these same "moulds" growing upon the teeth and dissolving their structures reaching into the soft investing and hard investing tissues which support the teeth, have the further power that when floated off into the blood stream they produce the great diseases first mentioned, of the heart, joint and kidney.

The knowledge of our research work of the past nine years has established the facts here outlined and has led to very positive and far-reaching changes in the character of our professional services. It would seem, when we take into consideration that pulps of teeth no longer need to be sacrificed for constructive dental repair, both beautiful and serviceable, that little is left for us to attain in the lengthening of life for individuals, for it is true that operative dentistry has almost attained perfection through the efforts of the leaders in that branch. It is also true that the pioneers in prosthetic work have laid foundations that have been so amplified by research attainments in the last five years that artificial teeth so ably fulfill the place of natural teeth that little remains to be desired.

In the field of orthopedia, we have developed a system of correctional treatment which makes it possible to beautify the face deformed by crooked teeth and so re-aline the teeth themselves that mastication is made perfect. Through the wonderful work of a Brophy we have been given a method going even farther in the correction of human defects. He has taught us how to make the little child speak, who, through the misfortune of imperfect development, is born with a cleft palate. Modern oral surgery has taught us how to overcome infections of the jaw and the traumatic damage wrought by war or injury. What line, then, is there left by which the dentists of the future can stride forward in their upward reach toward the lengthening of life and successfully confer a larger benefit upon humanity? I answer that the seeming blank wall against which further progress is now barred is only a seeming wall and that before the dentist of today there stretches a vista of successful attainments as great, if not greater than the vista stretched before the dentist fifty years ago.

There is among us a group of far-seeing individuals who, while recognizing the accomplishments of the past in overcoming and correcting the physical disabilities of our patients as we find them, have seen a vision and the perception of this vision has come from a broad study of the great biological question of life and growth. We, who have contented ourselves with fighting ills with which we are face to face, may now move

forward many paces along the upward path to a higher plane. On that plane in the future, we will strive to prevent the happenings which have shortened life and robbed it of much comfort. Our attainments in this field will, in the course of a brief period of years, tend to make unnecessary much of our now reconstructive knowledge by reason of the fact that our bodies will be taught to produce the immune forces which will make us repel the destructive powers of pathogenic bacteria.

Permit me to briefly place before you our present known methods of fighting the forces of the mouth which destroy the vitality of our teeth and integrity of our jaws. At the present time, through the recognition of the power of invasion and activity of mouth bacteria, we are able, through an exercise of the mechanical and therapeutic methods of removing and destroying mouth bacteria, to have made the progress that marks the last ten years.

The mechanical removal of destructive mouth mould by methods advocated by Barnes, Fones, Charters and Morton, has developed a class of professional men in this country who can show a great number of individuals in whose mouths no disease exists and whose bodies evince a high degree of immunity due to the mechanical removal of bacteria by efficient use of toothbrushes.

Our fundamental knowledge of bacterial life itself produced by research of the past three years has taught us that harmless but powerfully destructive action of a dialyzing soap applied to bacterial life breaks the bacterial membrane so that simple sodium chloride instantly destroys them. Our efforts thus far have been mechanical and therapeutic, mechanically removing the mould itself and by antiseptics, destroying the mould which we did not succeed in removing.

We now understand that it is better to grow bodies that of themselves will be so perfect and have so high an immunity that destructive germs cannot invade them. What then is the road to this physical perfection and freedom from destructive influences at our command to protect ourselves from pathogenic agencies? A moment's thought will convince us all that nutrition underlies the whole fundamental structure of the development of our bodies and their immunity to disease. What, pray, has the dentist contributed in this field? At once we point to our accomplishments of the past. Great as they are, they do not satisfy, for as a profession, we have been content to ignore the potential power at our command—the great underlying power of nutrition which enables the parent to produce nourishment and develop the normal child.

Therefore we must strive to understand the laws governing nutrition and, as nutrition begins in the mouth, I make the broad statement that if the dentist could understand the potential power of the mouth and teeth in the nutritional process and carry this knowledge to the patient, together with a knowledge of proper food, in such fashion that this knowledge would govern actively the daily life of the American people, the energy we should possess and our immunity to disease would be so broadly increased that the great group of gastrointestinal and starvation diseases which destroy the child life of this country would be overcome. We have done much to lengthen the life of the adult. Now we must apply our attention to that greater and more fundamental problem, to preserve and lengthen the life of the child and at the same time, grasp and apply in the treatment of disease the laws governing the nutritional processes of the mouth and teeth, together with a clearer understanding of what foods are demanded to build a normal body.

The great problem is, first, how we can best do this and second, what are the factors in our present civilization which, in spite of our increased knowledge of germ life and habits, our best endeavors to lessen dental caries have fallen short of the mark. The answer is that the food

habits of our people defeat us. Owing to the tremendous increase in city or urban life, more and more people are compelled to depend upon foods which are produced far from the site of its consumption and the foods which can be produced hundreds of miles away from the consumer, and be capable of enduring long journeys without decomposition, are not capable of producing for the consumer high immunity.

The foods most desired by the average worker are red muscle meats, cereals and tubers and these foods are notably poor in the three important substances which our research workers have designated "vitamins." While vitamins cannot be isolated, there are three of them particularly that must be consumed by both man and animal, if we are to maintain a high immunity. These three substances have been named fat soluble A, water soluble B and water soluble C. Fat soluble A is known to exist in most valuable quantities in pure milk and cream, although it is also available in cod liver oil and the wheat germ.

To drive home the thought that we need to study the food problem, let me relate some dramatic and striking examples, illustrating forcibly the evidence of the loss of fat soluble A failing to protect against, for one thing the deterioration of the eyes.

During the last war the Danes were induced to sell their butter fat because of the high prices obtainable. The result was that they fed their own children on skim milk and this lack of the important butter fat, which is to some measure an antiscorbutic, produced eye inflammation and blindness to many children. Characteristic pictures of conditions produced in these Danish children may be seen in the second edition of E. V. McCollum's "Newer Knowledge of Nutrition." The pictures were contributed by Dr. C. E. Bloch of Copenhagen (3).

A great mass of proof has been accumulated, too, in the countries where the people have been deprived of milk cows through the exigencies of war and testimony of what the loss of fat soluble A does to its peoples on a large scale are readily obtainable from the evidence at hand.

The facts above referred to are confirmed by Dr. Ernest Fuchs, for many years professor of ophthalmology in the University of Vienna, than whom there is no greater authority on eye pathology. At the time of writing this paper Prof. Fuchs (4) is delivering a course of lectures on eye pathology in the University of Minnesota.

Dr. McCollum also shows the result of lack of fat soluble A by the emaciation of rats as shown by the development of xerophthalmia in animals (5).

Another very dramatic mass example of deprivation of water soluble B and C is afforded by the "Kronprinz Wilhelm" poison squad. This ship came into Newport News on April 11, 1915, after having been at sea 255 days, having, during that period, sunk fourteen French and British merchantmen. During this period, from one single ship she captured five million pounds of fresh beef, bound from Buenos Ayres to London, from which she took all she could carry. She also had a great quantity of best white patent flour as well as sugar, canned vegetables, oleo and Huntley & Palmers sweet biscuits. Nevertheless with all these splendid foods at hand, the men developed symptoms of paralysis, dilated hearts, atrophy of muscle and pain of pressure over nerves with marked anaemia. At the time they came into port, they were coming down like nine-pins, sometimes dropping on deck, completely paralyzed.

Is it not strange that these rugged Germans, eating typical American meals for 255 days with plenty of white bread and fresh meat developed a condition of malnutrition? Is it not possible that thousands of Americans are suffering to a greater or less degree from the same type of malnutrition?

The treatment given these men, which

put them back on their feet again was water, leeched through wheat bran, the liquor drained from cabbage, carrots, parsnips, spinach, onions and turnips boiled together—four ounces daily of the fluid gained by boiling potato skins together for two hours, and also fresh eggs, milk and oranges. Between the time this ship came into port, April 11 and April 16, ten new cases were reported. After the 16th of April, when the above curious prescription commenced to be used, no new cases were reported and forty-seven men were pronounced cured by Dr. Perrenon, the ship's surgeon. The facts covering this case are in possession of Surgeon General Blue, and Dr. Arthur H. Glennan, acting surgeon and a rather full account of this incident may be found among our references (6).

Another mass example of what a deficiency diet did to a great group of men is afforded to us by the building of the Mamore-Madeira railroad in which case 4000 out of the 6000 men employed on this road subsisted on practically the same type of foods—red muscle meats and tubers and de-mineralized wheat products, with plenty of sugar. These men are buried in Candelaria Graveyard, three kilometres south of Porto Velho (6).

The symptoms developed by this large group of men were shortness of breath, palpitation of the heart, tremor of the nerves and wasting of the tissues. There were plenty of vegetables to be had by these men but they refused them calling it "monkey food."

In Northern Minnesota lies a little town in the iron mining district, where hundreds of thousands of tons of iron ore are taken from the earth and the work of excavating is done largely by foreign born citizens, where black coarse bread is the rule. Therefore they took tremendously to our splendid white flour bread; particularly do the children love this bread. Their diet is largely white bread with coffee with plenty of sugar. Here may we find the most tremendous example of dental caries at any point in the state of Minnesota.

I might go on and cite dozens and dozens of instances in which deprivation of the necessary vitamins has resulted in physical deterioration of one type or another.

Certainly I believe that the true reason for the increase in dental caries is malnutrition, in spite of our great increase in knowledge of the death-dealing diseases due to specific bacteria. This is accounted for by the deficiency of valuable vitamins which live in the bran coats of rice, corn, wheat and in leafy topped vegetables and milk fats.

If we could induce our millers to produce flour which would contain the bran coats and the wheat germ and instruct our patients to adopt such dietary regulations that the children would be taught correct food habits, together with our present system of prophylaxis, we would make an important step in the right direction.

McCollum tells us that cereals, in order to be sold and maintain their keeping qualities, are largely demineralizing from forty to forty-five per cent of the nation's diet today. This leads me to one other step which the dental profession can readily make and which we logically should make—a study of the mechanics and chemistry of mouth digestion.

A recent British health administrator is responsible for the statement quoted by McHarrison (7) that twenty-five per cent of all human ills is due to gastro-intestinal disease and this depends upon incorrect food. To this I make the further statement that the great bulk of this disease depends much upon the lack of mechanical preparation of food by the teeth, whatever that food may be and to the further fact that the energy upon which the human body depends for its action from hour to hour is the result of the transmutation of starch into sugar. This should almost altogether occur in the mouth, which seldom happens in the American child and adult. It is this

problem I shall now discuss, taking up first the mechanical phase of digestion; namely, perfect trituration and insalivation of food.

The digestion and assimilation of food depends upon the gastrointestinal tract and the work of digestion of food is distinctly divided and distributed into three distinct areas; the mouth, the stomach and the intestines. Unfortunately, mouth digestion is almost completely ignored by both dentist and physician except that both dentist and physician casually say to patients that the food should be well chewed. Notwithstanding these general directions, the study of test meals and a study of ingested food by direct observation through gastric fistulae show that man utilizes mouth digestion comparatively little. Almost all characters of food are bolted. The reason for the subdivision of the digestive act into three steps finds its explanation in the fact that every section of the digestive tract is specifically endowed with the power to digest and render assimilable certain types of food needed for the maintenance of energy and the building of the body.

Foods may be roughly divided, therefore, into two great classes—those which build the bone, muscle, glands and organs of the body and those which furnish the energy which creates the power of action of the body. The body itself utilizes in its structure all of the food elements at our command except the starches and carbohydrates. This means in the main protein foods and fats; water, oxygen and mineral salts go into the structure. The stomach, the second division digestive field in the gastrointestinal tract has been furnished with fluids to digest the protein foods. The intestine with its pancreatic digestive fluid attacks the fats and furnishes a second opportunity to assimilate starches which should have been digested in the mouth.

The starches are to the human body just what the gasoline is to the internal combustion engine and starches are transmitted into sugar by the ptyalin of the mouth and to prove the points which I am about to make in this thesis, I now give you the result of the chemical examination of chewed starches.

This piece of research has been under way for the past few months to the special end that proof direct and positive may be given to those who desire it, that almost all of the starch foods, wheat, corn, oats, rice, barley, potatoes, bananas and the vegetable starches found in beets, carrots, turnips and certain other vegetables can be completely changed from starch to maltose in the saliva if proper mastication and insalivation time is permitted. When these energy-making starches so transmuted into maltose leave the stomach, they pass from the stomach through its lymphatic openings and enter the circulation as potential energy makers almost at once. It is believed by observers and teachers of physiology that the normal human body should produce from one to two liters of saliva per day, quite enough to saturate all our starch food.

The chart above submitted shows that the starch reduction power of saliva increased in a very rapid ratio as the time of mastication and insalivation lengthens. In soft starchy foods, the moisture should be extracted and swallowed and the starch retained and chewed from one minute to a minute and a half.

The great fundamental reason for teaching this to patients is that it saves them a great waste of energy by stomach and pancreas for there are no means of changing starch to sugar in the stomach; for the gastric juices, hydrochloric acid, pepsin and rennin of the stomach are elaborated for the purpose of digesting protein foods and that the digestion of starch is impossible in the stomach after the powerful acid contents of the stomach have thoroughly neutralized the alkaline ferment of the saliva. It is the clinical observation of your essayist that there is more gastric indigestion and dyspepsia due to the fermentation of undigested starches in the stomach than any other

single cause. While it is quite true that the pancreatic juice and succus entericus can take up starch digestion when the starches finally pass unchanged from the stomach to the small intestine, it is a known fact that the starches enter the intestine in such a powerfully acid state that an immediate outpour of alkaline pancreatic juice must occur before the digestion of these starches and the fat can occur.

On account of the fact that a material which cannot be digested in the stomach tends to create an oversupply of hydrochloric acid, much added labor is entailed upon the pancreas and much unnecessary hydrochloric acid is created by the stomach through the compelling stimulation of these non-stomach digestible substances. Hence, it is a double waste—a waste due to the unnecessary production of hydrochloric acid and a waste due to the enormous over-demand for alkaline pancreatic juice to re-initiate starch and fat digestion in the small intestine. The gain made by the individual who utilizes his salivary glands to produce and change his energy-making starches into sugar so they may be immediately appropriated by the lymphatic stream presents a tremendous and positive benefit in the digestive process.

The figures here submitted have been produced in the following manner and curiously enough, as far as we can learn from the bibliography on the question of starch digestion and its assimilation, it has hitherto not been carried on in this manner.

It is quite true that a study of the digestive power of saliva has been made upon starch foods mixing them outside the mouth in a glass receptacle, but this does not give the same character of result as that given by thorough mastication and insalivation in the mouth. An observation of the curves presented on this chart shows conclusively that the amount of starch changed to sugar in the last half of any period in which the mouth is engaged in chewing and insalivating starch is more than double the same chemical change in the first half. This known fact of course has always been lost sight of and unrecognized in those observations on the power of saliva to transmute starch into sugar when the insalivation is done out of the mouth.

A study of the benefit of a thorough utilization of the mechanics of the mouth digestion may be illustrated in the following manner. It must be obvious to anyone that the more finely food is divided, the more easily can the gastric juices attack and dissolve it and, while it is quite true that meats of all kinds are dissolved by the hydrochloric acid and pepsin and that meat can be eventually digested, no matter what the size may be, the swallowing of food in lumps brings on a great waste of nervous energy and a considerable amount of unnecessary irritation to the stomach. A study of gastric digestion by Cannon (8), using the fluoroscope, reveals the fact that hard lumps, when permitted to enter the stomach, call out a considerable degree of muscular activity and that one may, with a fluoroscope, observe that a lump of hard food may be propelled by the hollow muscle of the stomach against its pylorus, which, when struck by a lump of undigested food, immediately contracts and remains contracted from six to eight minutes, thus shutting off the steady flow of partially digested material from the small intestine and at the same time wasting much nervous energy of that muscle gate—the pylorus and of the muscular coat of the stomach itself, tending to overwork that organ and tire it out.

No more efficient way of illustrating the value of mastication (which value should be taught by every dentist to his patient) can be demonstrated than through some such illuminative example as the following:

Let us imagine for the moment that it would be possible to swallow a cube of meat one inch square. This would present to the gastric juices six surfaces each of one square inch or six square inches.

If, instead of ingesting such a large lump of meat, the same bulk of meat were divided one hundred times in three directions, we would then have one million cubes of meat and the aggregate of the exposed surfaces to the gastric juices would be six hundred square inches, permitting the rapid attack and solution of the same bulk of meat in a considerably less amount of time and without physical irritation and overstimulation of the stomach and pylorus which must obtain where such a lump of slowly soluble material is compelled to remain as an irritating mass to be hurled rapidly against the stomach's lower gate.

Let me still further discuss the influence of the mechanics of mastication upon development and growth. It will be admitted by all that the law of compensation operates continuously from the cradle to the grave, that the maximum growth of the mind or body cannot occur without exercise of the functions which stimulate growth. Mastication of food, first, as applied to the food itself, makes swift and easy its solution by the gastric juices. Second, it brings about exercise of the jaws themselves which tend to develop stronger and better bony framework of the jaw, making room for strong, well-developed teeth, which cannot occur if the jaws receive no exercise in the mastication of foods. Third, thorough mastication of all foods increases the size of the salivary glands which have the power and are charged with the office of producing fluid which translates our energy making starches into maltose. Fourth, the growth of the skull itself, particularly the base of the skull which accommodates the medulla, which governs the functions of the body, is stronger and better developed than the pituitary body, controlling the steadfastness of purpose and will to accomplish, will be greater and better and more vigorous if the child is taught the absolute necessity of thorough mastication of all foods and in addition to that is compelled, by virtue of necessity, to have prescribed for him, foods which demand mastication rather than soft foods which so readily have been adopted by the American people.

One sees, therefore, that the mechanics of digestion is tremendously important and, may I ask this question of the dentists of these United States—how many men in the practice of dentistry have made it their duty to carry this fundamental knowledge to their patients in such form that it became habit with the patients? Who, more than the dentist, ought to teach the people the value of the mechanics of digestion? Who, more than the dentist, is charged with making clear to patients who consult him and put the care of their mouths and teeth into his hands, should teach patients the value of the part to be performed by the first three inches of the alimentary tract? Does any one of us deny Christ's statement to the Pharisees—"By their fruits, ye shall know them, for men do not gather grapes of thorns nor figs of thistles."

Could dentistry contribute to the life, health, and development of the American people in any more effective way than by proceeding to add to its splendid foundation of knowledge of how to physically maintain and protect the masticating mechanism than by adding to it the teaching of how the patient can get the most benefit out of its use? The knowledge of the chemistry and mechanics of mouth digestion, after once acquired by the dentist, is so simple and convincing that it seems it only needs to be understood to be utilized. If such utilization were made by us of these facts, we would easily add ten years to the life of the average human being in this country or any other. If we would be willing to appropriate this and use to the benefit of our patients what we now know as to the correct foods needed to construct the human body and see to it that these foods were apportioned to the growing child in the right amount and apply the laws of digestion to them in such fashion that these foods would reach the solvent juices of the gastric tract in such condition that their

rapid appropriation by the body could take place, we would have added more than ten years to life.

If it is incumbent upon the dentist to be educated and trained in anatomy, physiology and chemistry, why is it not justly his duty to apply to the benefit of his patient the knowledge so given him by his training? Why should he limit the knowledge and benefits that he can convey to the individual to merely repairing the dental structures themselves? If this be the case, I contend there is no real need of teaching him or maintaining his course—anatomy, chemistry and physiology. If, on the other hand, the makers of curricula are right and that we do need to understand the underlying laws that govern biology in its broad sense, why do we limit our activities to merely repairing mechanically the ravages of disease? Why do we not take this step forward and carry to our patients the knowledge we ought to possess regarding the correlation of this information?

I advocate and plead for the utilization of a greater study, a greater knowledge of the matters under discussion, but more than all do I plead for the utilization by us all of these facts in such a way as to produce a new race of supermen and women who will be comparatively free from disease because their jaws have been so nurtured, exercised and trained in the proper selection and mastication of foods and their utilization that disease must of necessity be repelled.

Why is it that certain individuals in a family will go down when exposed to the death-dealing power of diphtheria, typhoid, or small-pox, while other individuals will maintain a sturdy, immune front to the same attack? It is because in the one case the nutritional power of the individual is perfect and in the other case, the nutrition of the cells of the body has been faulty. There are many weak spots where the armor is imperfect and where the poison is able to attack and destroy the vitality of that unit of all life—the biological cell.

Bibliography

1. *Dental Summary,* (May) p. 395.

2. The specificity of Bacterial Proteolytic Enzymes and Their Formation, reprinted from the *Jour. Infectious Dis.,* Vol. 24, (April, 1919) p. 347-361.

3. McCollum's "Newer Knowledge of Nutrition" insert between pages 38-39; insert between pages 256-257.

4. Prof. Ernest Fuchs, lectures in Minnesota at present writing, June 3, 1922.

5. Insert between pages 256-7 Dr. McCollum's "Newer Knowledge of Nutrition."

6. McCann.

7. McHarrison, Robert—The Thyroid in Health and Disease.

8. Cannon.

THE FIELD OF THE REMOVABLE APPLIANCE AND THE BLENDING OF THE REMOVABLE AND FIXED PRINCIPLES

By VICTOR HUGO JACKSON, M.A., M.D., D.D.S., F.A.C.D., New York City

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

IN PRESENTING a paper on this subject let me first state that during my whole professional life, I have been engaged in the study and practice of orthodontia and, during these years, have tested all plans of moving teeth that have been known to me or that have been brought to my notice.

Some of these methods are now out of use, while others have been developed and still others improved by doing away with the undesirable features. After much thought and consideration, I confidently recommend a *removable regulating appliance.*

Fixed Appliance: An appliance that cannot be readily removed and replaced by the patient is known as a *fixed appliance.* This classification includes all appliances that are attached to the teeth in such a manner that they cannot be promptly removed nor replaced by the patient for cleansing or by the operator for polishing and adjustments.

Removable Appliance: An appliance is known as a *removable* appliance when it can be readily removed by the patient or by the operator for the purpose of cleansing the teeth and the appliance, or for its adjustment and repair.

Recently, the whole profession and many patients have begun to realize the great necessity of the careful cleansing of the teeth, being carried out systematically by the treatment known as prophylaxis and are becoming aware that, for that reason, regulating appliances and bridges of artificial teeth should be removable, but well sustained. Realizing this necessity, the writer has spent most of his professional life in devising and developing such appliances as would help to prevent decay and save the teeth.

A few operators have been opposed to removable appliances. The opposition was due principally to the careless habits of a few patients in leaving out the regulating appliances at times, which naturally would interfere with the progress of the regulating. However, by the use of a record card that the operator has at command, this practice would be readily detected and the condition corrected.

When the operator has discovered that a removable apparatus is not kept in place by the patient at all times, including time of mastication as directed, he should immediately ligate the appliance to the anchorage teeth with wire, making it a *fixed* appliance, which generally can be done in a few minutes, and then direct the patient to return in four days for further adjustment of the appliance and for cleansing. At the same time, he should notify the parents that the ligating is necessary, as the conditions require that the force of the appliance should be continuous. In wearing the appliance ligated, the patient soon learns that it is not as pleasant to use a fixed appliance

and make extra visits, as to wear a removable one, keep the teeth and appliance in a cleansed condition and make fewer visits. When necessary and well-managed, this plan works well.

When rubber *"equalizing-bands"* for equalizing the arches are used with a *fixed* appliance, the child is quite as apt to deceive the operator by leaving off the equalizing bands, which might prove as harmful in checking the work as the leaving out of a removable appliance. These appliances are definite in form and changes can be readily made for applying additional force.

When these appliances are strongly anchored to the teeth by a spring-clasp or a locking-device, they can be easily and quickly removed by first releasing the anchorage springs with the finger. Such an appliance is made strong and is positive in expanding the arch and moving the teeth. When managed properly, it should cause no pain or special discomfort to the patient. It is suitable for moving the teeth of either a young child or an adult even though the adult be of advanced age.

It is desirable that a regulating appliance be constructed and anchored so that definite and positive force can be applied at will. This is necessary in expanding the dental arch for a child, stretching the arch when it is in its most developmental stage, thus stimulating and gaining development at the sutures. At the same time the appliance must be strong so that if desired, it can be worn for a considerable length of time without changing its form; also that it can be worn through certain intervals of time while the teeth and arches are developing, in case of sickness, when traveling, etc.

Because of our ability to operate on young children for the purpose of expanding the arches and moving the teeth, while all of the tissues are in a semi-plastic condition, a better final result is attained from this early interference. With narrow dental arches their expansion and retention improves the occlusion of the teeth and causes the arches to harmonize with the features.

As the roof of the mouth is the floor of the nose, the early expansion of a narrow dental arch is of the utmost importance. Its expansion increases the capacity for breathing.

"As the twig is bent, the tree's inclined," but operating in early life in the above manner keeps the teeth from being bent at all and enables them to stand up straight ever afterward. With this knowledge, we may with confidence claim orthodontia and orthopedia of the face to be one of the most important specialties of medical science and the most important specialty of dentistry.

Therefore in dealing with these conditions, it is important that a removable appliance be employed, fitted to the present form of the arch and well-anchored. The design of the apparatus should be such as to permit at will the movement of any of the teeth in the arch in the required direction.

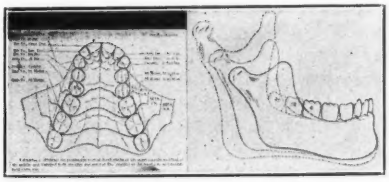
It should be the purpose of the orthodontist and the general dental practitioner to recommend early treatment of irregularities of the teeth and facial deformities. For many years the writer has been earnestly recommending this early treatment. The early lateral expansion of the dental arch for the free accommodation of the permanent teeth is recommended for the purpose of improving the general occlusion of these teeth and, at the same time, for *increasing nasal space.* With his experience, he is now even more impressed that *early* orthodontic and orthopedic treatment should be undertaken in cases having faulty development of the bony framework affecting the dental arches and the nasal organs.

The expansion of the dental arches with proper apparatus when they are in their most developmental stage prevents irregularity of the teeth by providing sufficient room in the arch for their free eruption and accommodation and, at the

same time, through *liberal* lateral expansion of the arch, the breathing space is increased, thus providing a more normal capacity.

From thorough treatment in necessary cases, there has been found an improved systemic condition, oftentimes bringing about a much stronger physical and mental state.

Figure 1 is a diagram outlining the different recognized stages of development of normal and abnormal maxillary arches. It is intended to indicate the progressive anterior development of the maxillary arch from childhood to adult life. In each stage, the arch develops



1 2

Figs. 1 and 2.—Fig. 1, drawing to illustrate the progressive normal development of the upper maxilla and that of the saddle and V-shaped arch, the time and order of eruption of the deciduous and permanent teeth, etc. Fig. 2, progressive development of the body and ramus of the mandible from childhood to that of the adult. Through the different stages, each molar erupts just in front of the ramus.

forward sufficiently for the successive eruption of each of the deciduous molar teeth of the child, and is followed by the time of the full development of the permanent or adult teeth in their regular order of eruption, in the sixth, twelfth and twentieth years. All of these changes in the anterior and lateral development of the maxillary arch take place with the palatal bones in front of the pterygoid processes of the sphenoid.

These processes are fixed points anterior to which all development of the maxillae takes place. Through lateral development, they influence to some degree the widening of the maxillary arch through each successive stage of its anterior development as indicated.

The maxillary arch is firmly supported by the skull, while the mandibular arch is suspended from the skull by ligaments and muscles.

Figure 2 shows the mandible which, together with the description given of the maxillary arch, illustrates nature's remarkably perfected plan of development of the dental arches and the erupting teeth; the teeth in each of the maxillary and the mandibular arches appearing in similar successive stages of eruption. Those of the mandibular arch appear in the same order and intervals and usually a little before the time of the eruption of the teeth of the maxillary arch.

The illustrations picture the variations relative to the developmental correlation of each of the dental arches and teeth. Each half of the mandible is divided into an ascending ramus and a body joined at the angle. All through the stages of the progressive development of the mandible, the condyle of the ramus normally rests at the glenoid fossae forming the temporomandibular articulation. At the same time the ramus and the body of the mandible are steadily developing in all of their proportions. The body is developing forward from the ramus and finally contains and supports all of the developing teeth in their different stages from infancy to adult life. It will be noted that each succeeding molar tooth erupts in the body of the mandible just in front of the ascending ramus.

A similar plan is followed through the eruption of the teeth of the maxillary arch, always with the palatal bone, and in front of the fixed points of the pterygoid processes of the sphenoid as described.

As we study these developmental features of the maxillary and mandibular arches and realize how the development of each of them is divided into harmonious stages for each series of developing

teeth, one can more readily comprehend how seriously it would affect the harmonious anterior development of the arch if a molar or a bicuspid tooth were removed from one of the lateral maxillary divisions. The loss of the tooth would cause an arrested development in that region while, at the same time, the opposite maxillary division would continue its normal anterior development, thus bringing about a warped condition of the arch, usually causing a change in the position of the incisor teeth from the median line. These conditions are generally corrected, however, and sustained by the use of equalizing posts, described in previous writings.

The body of the mandible is steadily developing forward from the ramus and lengthens in front of the ramus in each stage sufficiently for the normal eruption of each successive developing deciduous tooth and the succeeding permanent molars, as first the eruption of the deciduous molars, then of the first, second and third permanent molars in their regular order, in the sixth, twelfth and twentieth years. As stated, during all of this period the ramus is progressively lengthening from above downward with the condyle of the ramus resting in its temporomandibular articulation, increasing the length of the features; at the same time, the disto-antero measurement and all other measurements of the body of the mandible and of the ramus are increasing in proportion to the other bones of the skull. The illustration is arranged for the purpose of showing the progressive development of the mandible of the child from its obtuse angle to one approaching the right angle of the adult.

A great day is dawning in the science of orthodontia, and we have chosen for our life work a great specialty, not only of dentistry but of medicine. Our duty and responsibility to humanity are exacting. The teeth in mastication are the mill that crushes and, with saliva, mixes the food, which is the first step in the process of food digestion and any improvement in the occlusion of the teeth that can be brought about by our orthodontic treatment for that purpose would be of inestimable value to the patient.

The teeth are *distinct in their importance in all plans of animal nutrition.*

Again, orthodontic treatment is necessary as it is professionally acknowledged that between thirty and forty per cent of children suffer in some degree with nasal stenosis, as from hereditary lack of development of the organs or it may be from a general systemic or acquired condition. From this early congestion and swelling of some of the glands known as "Waldeyer's ring" or of the lymphatic tissues, the congestion or swollen condition clogs the apertures, thus diminishing the breathing capacity, which instinctively brings the muscular forces into action for the purpose of improving the breathing capacity and relieving this condition, but the congestion generally persists, gradually causing the habit of mouth breathing. Through this, the upper and lower arches become more separated. Their further separation through labored mouth breathing puts on the stretch other muscles which, through their natural tonicity, usually causes the maxillary arch to become narrowed and assume what is known as a V-shaped arch or a saddle-shaped arch; and from this same influence, the mandibular arch also is narrowed, often resting in distal occlusion, with the incisors antagonizing with the gum back of the upper incisors.

The laryngologist and rhinologist specializing in the treatment of faucial and nasal conditions, which require the increase of space for free breathing, are often lead to surgically remove some of the tissues that should remain if, without the operation, it be possible to keep the particular tissue in normal health. Some of these treatments have not proven successful.

The presence of adenoid tissue is normal, but, when it becomes inflamed and

swollen as from the forced restricted air currents in breathing, as stated, it clogs the nasal or pharyngeal space and interferes with respiration. The congestion of these tissues as with other body tissue results from the initial irritation which, in such cases is thought to be generally caused by the strained force of the air through the restricted areas of the air passages.

Generally, nature is helpless in improving these conditions and there seems to be no hope that through natural advancing development of the air channels, the space would become sufficient. The orthodontist through his experience recommends early treatment and often increases the nasal space by orthopedic movement of some of the bony framework. The early treatment for this special purpose is essential as one should operate while the bone is in its most developmental stage and before the dome of the arch encroaches too much upon the nasal space.

The roof of the mouth being the floor of the nose, the practical method of increasing nasal space to bring about a permanent normal condition of the framework and soft tissues of the maxillary and nasal region, is to expand laterally the maxillary arch early in life while these bones are in their most developmental and receptive stage. With this knowledge it is intended that the orthodontist through treatment should assist nature in increasing the nasal space when necessary and, at the same time, improve the occlusion of the teeth, as by the early lateral expansion of the dental arches.

In fact, it is nature's plan that, by the time the child is twelve years of age, all his maxillary arch in front of and including the second permanent molars should be established and be as broad as this part of the adult arch is ever intended to be.

In conveying these ideas to the parents, as is our duty, one should speak of the permanent teeth as adult teeth and it is even more impressive to the parent when speaking of the child's permanent teeth, that we speak of them as a man's or a woman's teeth, located in the child's dental arch.

We should impress it upon the mind of the parent that the permanent teeth when erupted are as large as they ever will be and that it is nature's intention that the arch should be broad enough to properly accommodate the permanent teeth in good line at the early age when each of these teeth is erupting; in fact, at this time establishing an adult arch in a child's mouth but, in a large percentage of cases, through heredity, constitutional conditions or the ordinary habits of life or environment, the arches do not naturally become broad enough or develop sufficiently in their lateral or anterior dimensions to accommodate normally the permanent teeth or to furnish necessary breathing space without orthodontic assistance.

In a certain number of cases, the mandible may be in an anterior position, or prognathous with the incisors resting in front of the maxillary incisors, in some instances even antagonizing with the gum, causing irritation or congestion; on the other hand, in a large percentage of cases of disturbed breathing, the mandible is in a posterior position with the lower incisors antagonizing with the gum far back of the upper incisors. The occlusion of the teeth accompanying either of these conditions is imperfect and permanently detrimental with the resulting expression of a too prominent or of a receding mandible, and in either of these cases, the facial line is imperfect and significant of these deformities.

Metals for Appliances

Precious metals for springs for making appliances have always been recommended by the author, but it often requires much more time in making and repairing them, than when suitable base-metals are used. He soon learned that

some base-metals have more spring properties and are found to be more efficient, as they are more resilient and persistent than others. The use of silver-nickel or German silver springs has generally been found satisfactory. Its appearance is desirable as it is near the color of platinum which is much less conspicuous than gold. This would prompt its continued use. Polished gold can be seen at a considerable distance from the patient, which, with some would be objectionable.

Another important reason for recommending base-metals is that springs can be more quickly united with chemically pure tin as a solder than with gold and can be unsoldered for changing the relationship of the pieces in a few minutes without drawing their temper or otherwise injuring them. This does not follow when gold solders are used.

Phosphobronze.—Phosphobronze of good quality is a satisfactory spring metal. It is similar to gold in color but is useful for making springs and spurs for orthodontic appliances. In use it holds its color well and is more springy than the metals described. When well-drawn, it is tough and suited for much longer service than any of the metals mentioned. This is owing to its resilience and persistence. In time all metals lose their springiness and come to what is known as a "stand." The metals above mentioned, usually come to a stand much sooner than the phosphobronze. It is claimed that now there is no lead in its composition. Chemically pure tin, as a solder, has more affinity for phosphobronze than for most other metals, thereby making a stronger union. In use there is no special chemical action apparent or waste around the springs. Other spring metals are under experiment and consideration.

Gold Partial-Clasp Metal.—After much necessary experimentation, I succeeded in forming a partial-clasp metal made of 18 karat gold rolled plate one-fourth on German silver, 36 United States standard wire gauge. In making an appliance, the gold side rests against the tooth, while the solder, chemically pure tin, is applied on the German silver side, because it has more affinity for the German silver than for the gold. The 18 karat gold as purchased in the market was at one time recommended by the writer for partial clasps but it was found that, after being in use for a time, it would peel from the solder and was therefore objectionable.

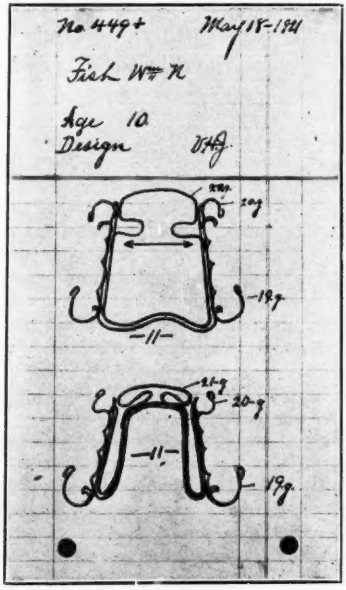


Fig. 3.—Free-hand drawings of apparatus to be made, entered in triplicating book.

Light Colored Bronze.—Partial clasps made of light-colored bronze spring plate No. 36 gauge, have been used in certain cases for several years with thorough satisfaction. When used for partial clasps and other parts of an appliance in contact with the gum, etc., the metal generally keeps bright like gold and does not en-

courage fermentation or stain the teeth. In practice, however, I favor and continue to use the gold partial-clasp metal.

Appliances to Design (Fig. 3)

Before designing a regulating apparatus, accurate models of the maxillary and mandibular arches of the teeth are made and thoroughly examined to determine how parts of an appliance can best be arranged to correct the irregularity.

All regulating appliances are designed from the study and measurement of the models and obtainable data. Freehand penciled designs of an upper and a lower appliance are made in a duplicating or a triplicating book, noting the gauge of the metal springs to be used as shown in Figure 3. One copy of the design remains in the book permanently; another, with the models aids the laboratory assistant in understanding the form of appliance to be made; and the third copy is utilized in cases of consultation, being forwarded to the consultant to assist in describing the plan of procedure and treatment.

In planning the apparatus the springs should be arranged to interfere as little as possible with the voice articulation. In moving the maxillary incisors outward, a spring should be carefully formed to follow the palatal surface of the incisors and so shaped in adjustment that it may be made to press on any particular teeth that need movement. The apparatus being designed with that in mind, there should be no lisping or interference in the enunciation of the sounds "T.D." and "S.," as in pronouncing these, the tip of the tongue necessarily rests back of the upper incisors.

Appliances to Make

I will describe the general plan I use for making regulating appliances, first giving the principal parts of an appliance and their purposes and also the method of uniting them with solder.

The general parts of an appliance are partial clasps, spring clasps or wire clasps, base wire, spurs and springs. These are usually united with chemically pure tin as a solder.

In making a regulating appliance, an accurate model is necessary. Any molar or premolar teeth that are not fully erupted but are to finally assist in the anchorage, should first have a groove cut in the plaster of the model beside the tooth toward the neck for the adjustment of a partial clasp to project under the gum to strengthen the anchorage. This is usually done with a rather straight hoe excavator. The operator must be sure to preserve the natural shape of the tooth and not remove or injure the plaster representing the gum on the lingual side of the groove as, in soldering the parts, the solder is liable to run into this injured part, which would cause the appliance when inserted to rest on the gum, while the thin partial clasp would pass between the tooth and gum without causing irritation.

Partial Clasp for Anchorage (Fig. 4)

A partial clasp is made of plate metal No. 36 United States standard wire gauge, of sufficient size to fit the lingual surface of a tooth used for anchorage. It is contoured with a contouring plier having the end of one beak cup shaped and the other formed to fit it, Figure 5. The partial clasp is always over-contoured to cause it to rest on the tooth at the neck and near the grinding surface. Figure 4, A, B, C. A partial-clasp is usually arranged to fit a premolar and a molar on each side of the arch. When connected by a base-wire in this manner, the anchorage is quite complete but, with the improved anchorage, it is generally found advisable to have also partial clasps arranged on all of the teeth in the lateral divisions of the arch, that is, the molars, premolars and canines.

Clasps for Anchorage

Various forms of clasps have been devised by the author for anchoring regulating appliances, many of which have

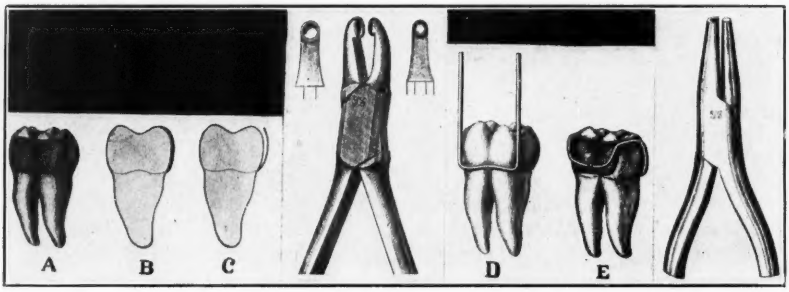
previously been described. Following are some of the ordinary examples:

A spring clasp (Fig. 6, D) is usually made of spring-wire No. 20, 21 or 19 United States standard wire gauge shaped with a clasp-bender (Fig. 7) or with round-nosed pliers to fit the buccal surface of an anchorage tooth near the gum with both ends formed to pass over the arch at the junction of the two adjoining teeth and to rest on a partial clasp and be attached with solder. It is then known as a spring-clasp attachment (Fig. 6, E).

Flat Clasp for Anchorage.—A flat clasp made from plate metal has its advantages. It can be shaped to pass between the teeth when desired, at any favorable location for anchorage and, at the same time, extend from the apparatus to rest on the buccal side of a canine, premolar, or molar, as described.

Locking Device

A locking device of an appliance will be mentioned here and more fully referred to later. It has a collar with a buccal lug resting near the gum, cemented



4 5 6 7

Figs. 4, 5, 6 and 7.—Fig. 4, partial clasps as used for anchorage in making regulating appliances. Fig. 5, contouring plier for shaping partial clasps. Fig. 6, (D) wire clasp, (E) partial clasp and wire clasp, forming a spring-clasp attachment. Fig. 7, clasp bender used in making base-wires, wire clasps, finger springs, etc.

Wire Clasp for Anchorage.—A round wire clasp for anchoring an appliance is used in any part of the arch. For clasping a molar it is generally arranged to extend from the appliance around the last molar of the arch to rest on the buccal surface near the gum or it is arranged to pass from the appliance over the arch at the junction of two teeth to rest on the buccal surface of a tooth as a molar, premolar, or canine. The wire clasp is usually preferred when the conditions are favorable as, when the teeth are well erupted, etc., it can be used without collars but, when the teeth are not well erupted, collars with lugs cemented to the teeth should be employed.

to a canine or a premolar and to a molar on each side of the arch. A wire clasp is formed to extend from the appliance over the arch in front (or back) of the canines and the molars, with the ends of each of the clasps terminating in a hook. This form of anchorage is suited for supporting an apparatus for any class of irregularity of the teeth.

Base-Wire

A base wire is the foundation of a regulating appliance. It is a large spring-wire of good temper, usually made of German silver, silver-nickel or phosphobronze. It can be made of any suitable spring metal. The base-wire may be a

rigid or a spring-base-wire. There are four general forms of base-wire, lingual, palatal, palatal with loop, and labio-buccal. The base-wire is divided into a body and arms. It should be sufficiently strong and rigid, so that it will not be sprung from its normal position, when necessary force is exerted by strong springs which are attached and extended for any purpose in moving the teeth.

The base-wire should not interfere with the action of the tongue nor with the voice articulation. In the maxillary arch, the body of the base-wire should rest in the posterior part, where the tongue exercises the least motion and where the patient would be least conscious of its presence. For the mandibular arch, the appliance should be arranged in a similar manner, the body resting below the margin of the gum.

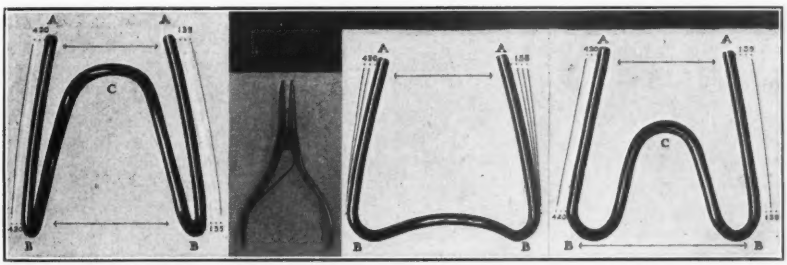
The different sizes of base-wire generally recommended are: For children between the ages of 3 to 6 years, No. 13 gauge; for children between the ages of 6 to 10 years, No. 12 gauge; for persons between the ages of 10 to 18 years, No. 11 gauge; for persons between the ages of 18 to 25 years, No. 10 gauge; for more mature adults, a more rigid base-wire, No. 9 gauge.

Lingual Base-Wire

Figure 8 illustrates a lingual spring-base-wire for expanding laterally the mandibular arch. It forms the framework or body of a regulating appliance, to which springs are attached for any purpose. It is made the same general shape as the base-wire with loop for expanding laterally the maxillary arch to be described.

It is shaped to follow the lingual curve of the arch just below the margin of the gum back of the incisors and extends backward and downward to the last molars where the ends are bent upward in a medium-sized curve to extend upward and forward, thus forming arms to rest on partial clasps arranged on the lingual side of the anchorage teeth, to which they are soldered with the wire clasps or spring clasps, spurs and finger-springs.

The action of the appliance is caused by adjusting the arms of the base-wire according to the part of the arch requiring movement. For expanding laterally the anterior part of the arch, the ends of the arms, "A-A", are pressed outward by the hands, or by an expanding plier (Fig. 9), thus bending the base-wire at "B-B". For expanding the posterior part of the



8 9 10 11

Figs. 8, 9, 10 and 11.—Fig. 8, lingual base-wire with numerals indicating the progressive steps in applying force in regulating. Fig. 9, expanding plier used in bending base-wire for adding force. Fig. 10, palatal base-wire for expanding laterally the anterior part of the arch. Fig. 11, palatal base-wire with loop for general expansion of the dental arch.

arch, the parts of the appliance at "B-B" are pressed outward bending the base-wire at "C".

Each change of added force for the lateral expansion of the arch should generally be made once a week and the change limited to one millimeter. The principle of applying the force is illustrated as follows: The arms of the appliance "A-A" are first to be forced outward bending the base-wire at "B-B" to cause the outer surface of the arms to rest at the dot-marks as indicated at O and 1, for the first application of force; again, the arms are pressed outward to rest at the dot-marks 1 and 2, for the second application of force; and for the third application to rest at 2 and 3; for the fourth application to rest at 3 and 4; for the fifth, to rest at 4 and 5, etc. The same principle is employed in adding force for expanding the posterior portion of the arch. It is noted that each measurement of force is alternated on the record card, first making the record of measurement on one side of the arch and then on the other as indicated by the numerals, that is, never making the measurement on both sides of the arch at one time, although the spring base-wire can be shaped to expand both the anterior part of the arch "A-A" and the posterior part of the arch "B-B" at the same time.

Palatal-Base-Wire and the Record Made (Fig. 10)

In the study of the form of the dental arch, it is often pre-determined that the posterior part of the arch is broad enough. In practice, it is found that in cases requiring lateral expansion of the dental arch, a less number need expansion of the posterior part, either maxillary or mandibular.

In making a regulating appliance, when only the anterior part of the maxillary arch required lateral expansion, a base-wire known as a palatal-base-wire is arranged to cross the posterior part of the arch where it is broad enough, usually opposite the last molars.

The palatal base-wire is always shaped to follow the palatal vault of the arch, with the ends bent forward to extend to the canines. Arms are thus formed which rest on partial clasps, usually arranged on the lingual side of each of the molars, premolars and canines.

The arms are the foundation of the anchorage portions of the appliance. The ends of the metal arms are tapered by filing to make them less bulky. They are soldered to the partial clasps with the ends of the spring clasps and finger springs. Arranged in this manner the ends of the arms are bent outward at regular intervals expanding the arch in the region of the canines and premolars, force being caused by pressing outward on the ends of the arms "A-A" which bends the base-wire at "B-B" following the systematic plan of progressive movement by steps as indicated by the numerals as 0 to 1, 1 to 2, 2 to 3, 3 to 4, 4 to 5, etc.

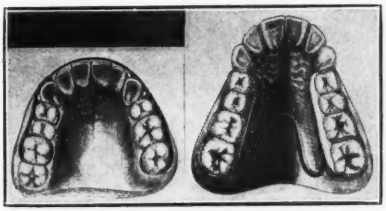
The apparatus with the palatal base-wire following the palatine vault of the arch, as stated, is not intended to expand the posterior part of the maxillary arch, as the palatine curve of the base-wire should never be straightened or changed for that purpose. It would have a tendency to tip the teeth in their sockets, interfering with the anchorage, but when posterior expansion of the arch is required, the base-wire should be provided with a palatal loop.

Palatal Base-Wire with Loop (Fig. 11)

When the maxillary arch needs general lateral expansion, a palatal base-wire with a U-shaped loop is employed. The apex of the loop "C" should always rest deep in the palatine vault, with the sides of the loop extending backward, following the deeper lines of the vault and forming a rather broad outward curve toward the molars on each side of the

arch as shown at "B-B" with the ends extending forward forming arms "A-A", the arms to be shaped and soldered to partial clasps on the anchorage teeth. These curves of the base-wire "B-B" should usually rest distally, a little beyond the line of the last molars of the arch in order to give added length to the portions of the loop from "C" to "B-B" to cause the base-wire to be more springy. This base-wire is similar in form to a lingual base-wire.

For expanding laterally the anterior part of the arch, the ends of the arms "A-A" are pressed outward, bending the base-wire in the posterior part of the arch at "B-B".



12 13

Figs. 12 and 13.—Fig. 12 labiobuccal base-wire anchored by spring-clasp attachment. Fig. 13, plan of arranging metal parts on a model for soldering in making a regulating appliance.

When the posterior part of the arch needs expansion, outward pressure is exerted on the sides of the posterior part of the appliance at "B-B" which bends the loop of the base-wire at "C" increasing the width of the loop. These changes should always be governed by the added measurement as indicated by the numerals, or by a record card described.

An appliance with this form of base-wire is adapted for the lateral expansion (or contraction) of either the anterior or the posterior part of the arch as needed, and the expansion can be carried to any desired limit, the same as with the lingual base-wire. This, the writer thinks, has not been accomplished as accurately with any other single device.

LABIOBUCCAL BASE-WIRE (FIG. 12)

A labiobuccal base-wire has been used many years in expanding the arch and in moving individual teeth. It is a curved bar located on the labial and buccal sides of the dental arch, sustained by entering tubes, eyelets, or hooks on collars cemented to the teeth, or by spring-clasp attachments. The labiobuccal base-wire is used for movng the teeth as by ligatures, extending from the bar around the teeth, by attached springs, etc. For retaining the teeth it may be sustained by spring-clasp attachments, by spurs projecting from collars cemented to the teeth, or by points projecting from the base-wire into tubes on collars cemented to the teeth. Its size varies according to the force desired. For many years I used the labiobuccal base-wire of various forms, for different purposes, as a plain base-wire, or a base-wire with corrugations, U-shaped loops, etc. The base-wire having loops is often the more serviceable.

The palatal and lingual base-wires are preferred. It will be noted that they are generally of rather large diameter and purposely made stiff to serve as a foundation for the regulating appliance and to prevent the teeth from moving back and forth in their sockets, as during mastication, while being regulated and while being retained. In this manner tenderness is avoided. Often when the teeth are supported only by a small spring, they are easily disturbed in their sockets and become more or less tender, delaying new bone deposits and consequently there would be an inclination on the part of the patient to avoid necessary normal mastication. Accordingly, there is less tendency to excessive absorption of the alveolar process and less irritation and general tenderness of the teeth than when small springs are used. As noted, the action of the large spring base-wire is

controllable and the extent of each movement is limited as desired.

Springs

Springs of different shapes for moving the teeth as referred to, are made of silver-nickel, phosphobronze or spring-gold. Any suitable spring-metal desired can be used. The sizes usually employed are Nos. 18, 19, 20, or 21, United States standard wire-gauge.

Springs are usually named according to their shape, position or purpose, as finger springs, loop-shaped springs, semi-circular springs, etc., several forms of which are shown in this paper.

The springs should be arranged to interfere as little as possible with the action of the tongue, the lips, the cheeks or with the voice articulation.

Spurs

The appliance is designed so that it will be supported by the teeth to prevent it from resting unduly on the gum tissue. For this, a wire spur (Fig. 20) is attached to the body of the apparatus and shaped to extend and rest usually on the crown of a molar and a premolar on each side of the arch.

A method that is superior in some respects for supporting an appliance is to attach a shelf on the lingual side of each collar used for the anchorage-locking device, the spur or shelf being attached to the gingival edge of the collar near the gum line (Figs. 23 B, and 19 B).

A similar shelf is also used in case of close occlusion of the teeth, and for moving teeth bodily. The shelf is usually made of plate metal about No. 28 gauge, arranged to project from the collar about two millimeters, the parts being properly fitted and soldered in the usual manner. The collar is then cemented to the teeth and a model made representing the collar and shelf in place.

14 15

Figs. 14 and 15.—Fig. 14, plan of holding metal parts on a model while applying solder with soldering iron. Fig. 15, showing the natural divisions of the arch separated by sutures. Lateral maxillary divisions and intermaxillary divisions.

The appliance is designed and the parts arranged on the model to rest on the shelves with the wire-clasps extending to the buccal side to complete the anchorage (Fig. 13). When a regulating appliance has been designed, the different parts are always shaped to the model and then assembled, to be united by solder.

Soldering (Fig. 14)

In soldering, the base-wire, spurs and springs are usually held by moldine in position for the soldering and, when necessary, further sustained by pressing steel pins by the side of them into the model.

Solder.—Chemically pure tin is usually employed as a solder in uniting the parts of the appliance, the tin being fused by a large soldering iron. Before soldering,

the parts are fluxed with chloride of zinc or with a no-korode flux.

Knowing the detrimental systemic effects of lead, the writer early became convinced that in making these appliances it was not wise to use a solder that contained lead, but he wishes to say that he has never known of any case where harm resulted from the use of such a solder.

When lead is excluded from the metals used in an appliance, it has been found by long experience that there is less chemical action caused in acid mouths and consequently less oxidation or tarnish of the appliance.

The practice of gold-plating or gilding a regulating appliance made in this manner is generally objectionable, as gold, chemically deposited on the whole of an appliance is porous and when bathed in saliva, sometimes develops a chemical action, which causes the metal to tarnish more than when no plating is employed. However, when gold-plating is to be used, it is usually advisable to first apply a coating of copper and then a good coating of gold.

Analogy

To impress upon the mind the analogy between removable regulating appliances and the human body, the author will refer to the many necessary mechanical features embodied, their capability and their impressive similarity in form and action, an understanding of which he is sure will prove instructive and beneficial.

The base-wire is the foundation or body of a regulating appliance. As previously stated, it is made of large spring-wire. The portion of the base-wire connecting the lateral divisions of an appliance is always rather large and strong; the ends are bent to project forward (or backward), like arms; they are shaped to rest on the partial clasps usually on the lingual side of the anchorage teeth.

The base-wire or body may be compared to the human body with the arms extending forward from the shoulders, as the arms of the base-wire extend forward from its body or shoulders. There are fingers on the ends of our arms, and, likewise, there are metal fingers arranged to project from the ends of the metal arms of an appliance in the form of springs.

Therefore, in making a regulating appliance, it is essential that it have a strong body, strong arms, and strong fingers, as each is to do a definite work. They should be large and strong enough to move the teeth the specified distance in a given time and not move the teeth farther than intended.

If a man be not strong enough to accomplish promptly the work laid out for him, a stronger man is employed. Following the same idea, one would make a regulating appliance strong, always having it built strong enough to cause the arms and fingers to act definitely in making the desired movement of the teeth and process.

Again, the human body performs all movement by muscular action; in effect, this is similar to the action of the spring parts of the regulating appliance. The fingers of the human body grasp objects and move them definite distances with ease, following the command of the will. The plan of this system of regulating is to have an appliance built sufficiently strong and so thoroughly anchored, as to move the teeth in the desired direction, in a limited time.

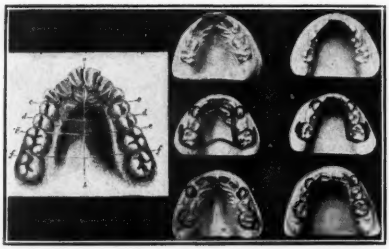
The analogy mentioned will be apparent in the study of the different appliances presented, thus making some of the details in their description more readily understood. In designing an apparatus for moving the teeth, one would generally be led to adopt correct forms of metal arms and fingers, etc., by first shaping his finger as he would to move a similar object.

Divisions of the Dental Arch (Fig. 15)

In the study of the dental arch for the purpose of orthodontia, as for expanding the arch or bringing about any necessary correction in the position of the teeth or

for any other purpose, the author has found it an advantage to divide the arch into three divisions, sections, or segments: as the right maxillary division, the left maxillary division, and the intermaxillary or incisive division.

These divisions of the maxillary arch are the natural divisions as separated and distinguished by the lines of the premaxillary and intermaxillary sutures. The intermaxillary divisions contain the four incisor teeth. Each lateral divison of the arch includes the canine, premolars and molars. The divisions can be symbolized as follows: R-M-D, L-M-D, I-M-D.



16 17

Figs. 16 and 17.—Fig. 16, lines of expansion of the arch indicating necessity of moving cuspids outward with the lateral maxillary divisions. Fig. 17, models with appliances showing child's arch, four years old before and after expansion.

To complete this system for study, record and convenience, the mandibular arch is separated into similar divisions. Accordingly in the examination of orthodontic cases, one should determine in what division of the arch the irregularity is located. The regulating appliances described are also divided into the divisions, constructed to deal with the irregularity presented in each division of the arch. When the teeth are irregular, they are usually much crowded in the arch. This is most generally evidenced by there being insufficient space between the canines for the proper arrangement of the four incisors.

Many operators are making a mistake in expanding the dental arch to provide room for the incisors by moving laterally outward the premolars and molars without moving outward at the same time the canines, which are included in the lateral maxillary divisions of the arch.

Figure 16 illustrates the lines of movement of the teeth in properly expanding the arch laterally. It shows that the movement of the molars and premolars in a buccal direction, as illustrated by the lines, "C, D, E, and F" does not increase the width of the arch anterior to them as would be required.

Therefore, in expanding the dental arch laterally, the appliance should always be arranged to include the canines if present. With these conditions presented in such a large majority of cases, it has been necessary to devise a standard appliance, strong and complete in itself, that is definite, thoroughly efficient and which can be handled. It must have a strong foundation to which springs are attached for sustaining the anchorage and cause individual tooth movement.

Orthodontia an Exact Science

Orthodontia has been recognized as a science, but it is desirable that the different phases of orthodontia be so thoroughly understood as to deduce it to an exact science and that the mechanics be so simplified that any operator of steady judgment can perform at least ordinary operations without overtaxing his mechanical skill. To accomplish this a record card was introduced.

Record Card.—Several years ago for the purpose of securng accuracy in applying force for the regulation of the teeth, the author devised a careful pencil tracing on a record card of each regulating appliance in use before applying force and indicating on the card a record of the amount of each subsequent change in the appliance for moving the teeth. This would be a permanent record of the

changes of force applied and the date of the change.[1]

In Figure 17 is illustrated a case with narrow arches and posterior occlusion with a maxillary and a mandibular appliance utilized for expanding and equalizing the arches for a child four years of age. The maxillary appliance has a palatal base-wire; the mandibular appliance a lingual base-wire; force is caused by bending outward the arms and adjusting the springs of each appliance by rule. With these appliances shown, force for

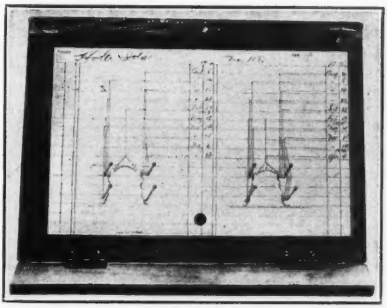


Fig. 18.—Tracing board with record card in position showing record of time and amount of changes in appliances with dates.

the lateral expansion of the maxillary arch would be caused by grasping with the hands the front ends of the arms of the appliance and pulling outward, thus bending the base-wire slightly, which, when inserted in the mouth, would cause force to expand laterally the front part of the arch. In applying force for the lateral expansion of the mandibular arch, the front ends of the arms should be pulled outward. This would bend the base-wire at the curves opposite the molars which would affect the expansion of the anterior part of the arch. For expanding the posterior part of the arch, one would pull outward on the sides of the distal end of the appliance, which would bend the loop of the base-wire as necessary.

Each of the mentioned changes of form would be governed by the successive measurement indicated on a record card.

As stated, a record of the amount of each application of force applied is recorded on a ruled record card (Fig. 18). When in use this card is supported by a tracing board which usually has a hinged ledge, or shelf, for folding over the lower edge of the card. In registering the shape of the appliance it is placed on the card against the edge of the ledge.

With a sharp lead pencil a tracing is made of the outer contour of the arms and springs of the appliance. A steel pin one and three-quarter inches long is then pressed through the card into the board close beside the arms in the location of each of the canines and molars used for anchorage. With the sharp lead pencil the prick-marks in the card are blackened. When force is to be applied, another prick-mark is made, usually one millimeter from the first, in the direction it is intended to bend the arm or spring of the appliance, for causing force. The indicated pin punctures are a permanent record of the successive applications of force, generally of one millimeter. The arms of the appliance are bent outward to rest against the pins after the added measurements. Each of these indicated changes of force is known as a "step". The first step, generally being one-half millimeter, later one millimeter, should be made at intervals of once a week. When the regulating is advanced considerably and it is desirable, visits may be made once in two weeks or even at longer intervals.

In some cases, it is wise not to advance in the movement too rapidly, although a change of more than one millimeter is often made without discomfort to the patient. In the expansion of the arch laterally, it generally requires a change of only a few millimeters. From each step recorded on the record card, a line is ex-

[1]Jackson, *Orthodontia,* (1904) 113.

tended upward for recording the date of the change.

The card is ruled from above downward, forming columns, and the date of the change in the appliance is made to agree with the new tracing and is inserted in the column at the right. A light line is drawn from the date to the dot-mark, which completes the record of the change that is made. Every subsequent change in the shape of the appliance is recorded by one or more dot-marks as required and the date noted in the column in the same manner with a line connecting them. If a change is made in two or more springs the same date, the lines extending from the dot-marks to the date should converge.

With an appliance supported with spurs as referred to, there would be no pressure caused on the gum tissue and by following the plan of the record card, that is, indicating only short distances or steps by the dot marks, and leaving an interval of seven days between visits, the patient can be assured that there will be no pain or especial discomfort in the regulation of the teeth.

Generally, only a few definite steps on the record card and corresponding changes in the appliance are required to move the teeth as far as desired. Changes for the application of force should never be made by guesswork but always according to the record card.

Improved Anchorage with Locking Device

We previously have considered plans of anchoring regulating appliances with spring-clasp attachments and, anchoring appliance with wire clasps; I will now refer particularly to a plan of anchoring regulating appliances by a locking device.

With this plan, the apparatus is known as a movable apparatus, as it can be removed promptly by the patient and, at the same time, it is retained equal to any fixed apparatus. It is used for causing any and all necessary movements of the teeth.

With this double principle of anchorage, the plan may be readily described as "the blending of the removable and fixed principles in orthodontia."

To make these appliances (Fig. 19) a broad collar with a buccal lug located to rest near the gum in the center of the tooth is cemented to each of the maxillary and mandibular canines, "A-A", and a broad collar with a buccal lug located near the gum is cemented to each of the maxillary and mandibular distal molars of the arch "E-E".

After the collars are cemented in place, accurate plaster impressions of the teeth and models are made; the models represent the collars with lugs or tubes in place.

In making an appliance for the maxillary arch, partial clasps are arranged on the lingual side of the anchorage molars and canines, the partial clasps resting on the collars represented in plaster and, when desired, partial clasps are also arranged on the intervening teeth.

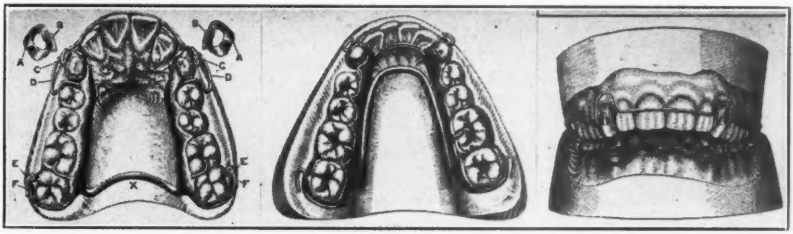
When the distal part of the arch is broad enough, a palatal base-wire "X" is planned to cross the arch opposite the posterior molars with the arms extending forward and shaped to rest on the partial clasps arranged on the lingual side of the anchorage teeth.

The appliance is retained to the teeth by wire clasps which are soldered with the partial clasps, spurs and ends of the semicircular spring to the arms of the appliance with chemically pure tin by using the soldering iron. Two wire clasps "F-F", are shaped to extend from the distal part of the anchorage portions of the appliance, one on either side, to clasp the second molars chosen for anchorage. The free end of the clasp is made to pass above the lug "E" on the collar and bent backward upon itself, forming a rather long hook.

The wire-clasps "C-C", attached to the anterior part of the anchorage portions of the appliance, one on either side, are shaped to extend over the arch at the

junction of the lateral incisor and canine. They fit well in the groove and reach near the gum line on the buccal surface of the canine, where each is bent backward in a curve to pass above and to engage with the lugs on the collars located at the center of the teeth. The end of the clasp is curved forward on itself, forming a hook.

The wire clasp passing above the lug on the collar for anchorage completes the locking-device of the appliance. In this manner, the appliance is held firmly in position for causing any movement of the teeth.



19 20 21

Figs. 19, 20 and 21.—Fig. 19, maxillary regulating apparatus held in place by the locking device. Fig. 20, lingual appliance with locking device for anchorage. Fig. 21, upper and lower models of case with appliances showing corrected occlusion after equalizing the arches.

The appliance is easily removed by unhooking or unlocking the clasps from the lugs with the finger, which liberates the appliance. This can be done either by the patient or the operator. The hook-shaped end of the clasp makes it the best form of attachment to grasp with the finger nail for unlocking the appliance. A hook of this shape is thoroughly suited for the adjustment of rubber equalizing bands as for the correction of protrusion of the maxillary arch or for a prognathus mandibular arch.

By the use of an appliance with a palatine or a lingual base-wire and a correct tracing to direct the changes, the expansion of the arch is made easy and progressive step by step, in the manner described in connection with the record card.

An appliance for the expansion of the mandibular arch or the equalizing of the arches, is made with a lingual base-wire No. 10, 11 or 12 gauge (Fig. 20). It is anchored to the teeth with wire clasps. The locking device is arranged the same as in the maxillary arch for retaining the appliance.

A lingual base-wire is shaped to follow the lingual curve of the arch. The front part, back of the incisors, rests just below the gum line and extends backward and downward to the posterior molars where it is bent into a medium large curve with the ends extending forward to the canines, forming arms to rest as usual, on partial clasps arranged on the lingual side of the anchorage teeth.

The ends of these arms are tapered by filing, so that the front anchorage portions will not be bulky, but they are kept sufficiently large to retain their strength. The arms with the other parts, partial clasps, wire clasps, finger springs and spurs are soldered as described. Curved finger springs, as shown, are often utilized in reshaping the line of the incisors between the canines.

Figure 21 illustrates a front view of the maxillary and mandibular dental arches with the teeth in occlusion after

correction, on each of which the appliance is arranged in position. The plan of the anchorage-locking device and the semicircular springs of the appliance for moving the incisors are especially shown.

Equalizing the Dental Arches, Anteroposteriorly

In Figure 22 is shown the original occlusion of the teeth in the case just described and illustrated by Figures 19, 20 and 21. It shows a receding mandibular arch and a prominent maxillary arch with appliances in place for their correction, by equalizing the arches. The case after treatment is illustrated in Figure 21.

By the term "equalizing the dental arches" is meant the making of the unequal, so that the teeth of each arch will occlude normally with the teeth of the opposite arch. In equalizing the dental arches, anteroposteriorly, the distance between the maxillary canines generally needs to be increased to properly accommodate the four maxillary incisors and, to permit the mandibular arch to be moved forward as it should, with the maxillary arch moved backward as necessary.

It often occurs in cases of this type of irregularity that the maxillary or mandibular incisors are too prominent and need to be moved inward to complete the equalizing. This is generally accomplished by the use of a semicircular spring with U-shaped loops, as shown at "D-D", arranged to pass in front of the incisors with the ends of the loops attached to the anchorage portions of the appliance. Added force is caused by closing the loops of the spring slightly at a time.

Should the mandibular canines occlude detrimentally with the wire clasps of the maxillary appliance at any stage of the regulating, the clasps could be changed to pass from the appliance back to the maxillary canines and rest above the lugs on the collars rather than pass in front of them. The front part of the arms of the appliance could then be dressed away as necessary.

Sometimes when the incisor teeth of the maxillary arch are too prominent, they should not be moved inward until the teeth of the lateral maxillary divisions of the arch are forced backward to a normal occlusion in the process of equalizing, after which a labial semicircular spring should be attached for moving the four incisor teeth inward to take a good line with the canines which just previously had been moved backward in the line of the arch. With this plan the normal lateral occlusion of the teeth being first established, the maxillary anterior protrusion can then be more thoroughly reduced by moving the incisors inward.

For cases requiring the maxillary or mandibular incisors to be moved outward, finger springs are attached to the anchor-portion of the appliance, one on each side, extending forward in a curve to cause the necessary force, as shown in Figure 20 or, a semicircular spring with U-shaped loops can be employed for this purpose, it being attached to the anchorage portions of the appliance. For this and all purposes, the advantage of having the regulating appliances built in divisions, will be readily understood.

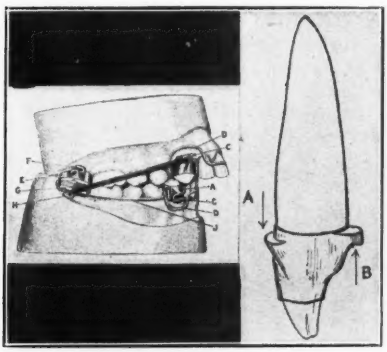
Sustaining Bar (Fig. 22)

In equalizing the dental arches anteroposteriorly, it is sometimes necessary to stabilize the anchorage teeth in a manner that will keep them in an upright or perpendicular position, while force, as by rubber equalizing bands, is applied in moving forward or backward the maxillary or mandibular arches and during their retention.

For the purpose of stabilizing the canines of the mandibular arch, a small tube a little shorter than the width of the collar on the canine as shown in the figure, is soldered to the distobuccal surface of the collar, usually in a perpendicular positon, there being also a lug on the buccal surface of the collar shown at "A" used for anchorage.

For sustaining the molar in an upright position, to the buccal surface of the collar, there is soldered a horizontal tube "G"; this is a little shorter than the anteroposterior measurement of the molar, to support the end of the sustaining bar and to serve as a lug for the wire clasp "H" of the appliance.

Through the tube on the molar is passed a wire, usually No. 18 gauge, extending forward following the gum line to the canine, where it is bent into a small perpendicular loop, the free end entering



22 23

Figs. 22 and 23.—Fig. 22, apparatus and models having posterior occlusion of teeth with plan of equalizing the arches to correct the occlusion. Fig. 23, collar with a shelf "B" and lug "A" arranged for moving a tooth bodily.

the tube on the collar from above downward. With the bar entering the tubes in this manner, it sustains the anchorage teeth as anterior or distal force is brought to bear on them. Accordingly, the bar is known as a sustaining or stabilizing bar. Any other teeth in the arch can be sustained in a similar manner. When it is desired to sustain the anchorage teeth of the maxillary arch, the same plan described would be employed. In either case the sustaining bar is not often necessary.

If the second molars are not sufficiently erupted for anchorage, the collars should be cemented to the first molars, but it is always advisable to have the anchorage of the distal part of the appliance as far back in the arch as is practicable.

The force of the rubber equalizing bands in equalizing the dental arches should be sufficient to cause the movement to be rather prompt, and it is well that the equalizing hooks in the plane of the maxillary and mandibular arches, be not located too near together, that is, to have the hook for supporting the equalizing band to the mandibular arch and the hook to hold the band of the maxillary arch a considerable distance apart, in order to stretch the band sufficiently to cause a proper amount of force; at the same time, by having the hooks farther apart, the equalizing band would not interfere with the patient in opening the mouth, as in mastication, without causing much additional stretch of the equalizing bands. When more force is necessary, a longer stretch of the equalizing bands can be attained by soldering another wire hook to the molar-wire clasp to rest back of the lug on the collar.

The hook is shaped and bound to the wire clasp by a piece of ribboned metal. The latter is prepared by rolling very thin a soft and small-sized bronze wire. After rolling, one side of the metal should be slightly tinned and wound twice or more around the parts to be joined with the tinned side in, then soldered so that the solder, when applied with flux, will follow the tinned surface of the metal, which would suck the solder in around the wires and make a strong joint. With this plan, the equalizing hook will be extended backward nearly the width of the molar.

Another plan of locating the equalizing hook farther back in the arch is to shape a spring wire about No. 16 or No. 17 United States standard wire gauge to be attached to the lingual side of the appliance and to extend back of the teeth as far as desired, then bent in a curve to the buccal side of the arch, where an equal-

izing hook is attached to rest in line with the buccal side of the molars.

To increase the force of the equalizing bands before the permanent canines are erupted, it is sometimes advisable to attach a rigid wire extension through the space caused by the loss of a deciduous canine or a deciduous molar to the buccal side and to extend forward as far as the lateral incisor and there have an equalizing hook attached. In this case, the anterior part of the appliance is to be retained to one of the teeth, as a premolar or a deciduous molar, by a locking device in the usual way. When not sufficiently well-sustained in that manner, a collar with a suitable labial lug for its support should be cemented to the lateral incisor.

Occasionally, for anchorage, when several of the deciduous teeth in the front part of the arch are absent, equalizing hooks are attached to the loops of a semicircular spring that is arranged to pass in front of the incisors. This spring is retained by a collar with a labial lug, cemented to each of the lateral incisors. When this form of apparatus is used, generally a lingual semicircular spring is adjusted to prevent the incisors from being forced backward in the arch as labial equalizing force is applied. These extentions are applicable in the treatment of either arch for causing greater force and are necessary in certain classes of cases.

Also as a greater or lesser force is often required, it is advisable to keep in stock equalizing bands, of the same size but of different tensions.

In expanding the arch laterally, as previously described, or in moving the teeth too rapidly, they are liable to become tipped outward abnormally. This is often noticeable as in moving the canines laterally outward in providing more space for maxillary irregular incisors. The tipping of the canines can be easily prevented and the teeth moved bodily by the anchorage-locking device described; that is, a spur or shelf of plate metal is attached to the lingual side of the collar used for anchorage, at the gum line. The apparatus is made to rest on the lingual shelf and the wire clasp extending from the apparatus is shaped to rest above the buccal lug on the collar as shown.

By this arrangement, the appliance resting on the lingual shelf B, and the wire clasp extending to the buccal side of the tooth and pulling on the lug, the canine is held in a perpendicular position as force is applied in moving it bodily outward (Fig. 23, B and Fig. 19, B). If at any time the canine is not sufficiently perpendicular, the end of the wire clasp can be made to pull harder on the buccal lug "A" to give the canine the position desired.

In a similar manner, a premolar or a molar can be moved outward bodily by having cemented to it a collar with a lingual shelf and a buccal lug with the appliance arranged to rest on the lingual shelf, and a spring clasp be shaped to extend from the appliance back of the molar to the buccal side to pull on the lug provided.

In equalizing the dental arches anteroposteriorly, when there is a considerable force on the mandibular molar caused by the stretch of the equalizing band pulling forward and upward on the lug of the collar, it sometimes tends to tip the crown of the molar inward more and apex of the root outward. When this occurs, it is readily prevented by soldering a lingual lug on the collar facing gingivally, and shaping a small bar of the appliance to catch underneath the lug. At the same time a wire clasp that extends from the appliance back of the molar is fitted to rest or press on the upper surface of a buccal lug provided for righting the position of the molar. When desired, as in equalizing the dental arches, the end of the clasp can terminate in an equalizing hook for holding an equalizing band.

For promptly tipping the tooth more upright, the buccal portion of the spring is bent downward to press more heavily

on the buccal lug, while both this force and the force of the equalizing band is lifting upward on the lingual lug.

In such a case, the wire clasp would be made of a larger wire than usual to be sufficiently stiff to promptly cause the necessary force, the force being governed according to the desired amount of bodily movement of the root of the molar, so as to give it a more upright position.

The same principles of anchorage would apply in either of the cases described and is applicable for causing the similar

24 25

Figs. 24 and 25.—Fig. 24, examination of profile to locate the deformity. Fig. 25, jaw forced forward to varify the diagnosis. Upper arch to be forced posteriorly.

movement of any teeth in the arch. When the molar-wire clasp is properly adjusted for anchorage, the ordinary force in regulating seldom changes detrimentally the position of the molar.

In further considering the subject of equalizing the dental arches, we shall examine the facial features of one or more cases and call attention to some necessary points in their diagnosis. In cases of maxillary protrusion, it is always advisable to examine carefully the facial line and determine whether the mandible is sufficiently prominent, or whether it should be made more prominent (Fig. 24). This is usually determined by the study of the profile facial line, by holding upright with the hand toward the patient a small pencil or straight-edge and sight across it so that the line from the eye will rest on the forehead and, at the same time, on the point of the chin and from this determine whether the chin is sufficiently prominent or too prominent to compare with the line of the forehead and balance well with the features. In this case it was determined from examination that the mandible was practically prominent enough. In order to demonstrate this principle more fully, it is usually wise to ask the patient to move the mandible forward as much as would permit the mandibular teeth to interdigitate with the teeth of the maxillary arch as shown in Fig. 25, from which it will be seen by examining the changed facial line that both the mandibular and the maxillary arches would be much too prominent. Therefore, for the correction of this condition, it requires more particularly the reduction of the prominence of the maxillary arch and, accordingly, in equalizing the arches in this case, the lateral maxillary divisions of the arch should first be moved backward sufficiently to occlude properly with the teeth of the mandibular arch.

With our plan of equalizing the dental arches, this is easily accomplished, as all of the mandibular teeth would form an anchorage for moving backward in the line of the arch a less number of teeth in the maxillary arch, as the molars, premolars and canines, until they rest in normal occlusion with the teeth of the mandibular arch. The prominent maxillary incisors should then be moved inward to occlude properly with the mandibular incisors by attaching a semicircular spring with loops to the apparatus for the purpose, thus reducing the prominence of the maxillary arch. The intermaxillary force employed should be continued to counteract the force of the labial spring in moving the incisors inward. These cases require to be well retained.

There is a vast variety of neglected cases

that should be treated by the orthodontist. He is sometimes called upon to meet extreme conditions. Figures 26 and 27 illustrate an important example of a trying case. By studied treatment, marked improvement was brought about in the facial lines and in the occlusion, as shown by Figures 28 and 29.

The anatomical changes in the mandible from infancy to old age must always be kept in mind in our diagnosis. The angle of the ramus and body of the mandible in infancy is obtuse and through normal development of the body

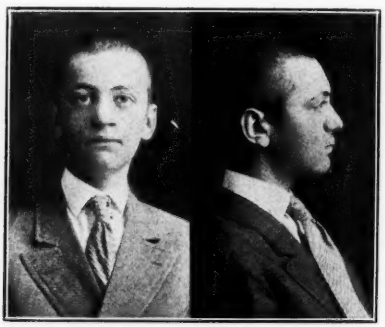
26 27

Figs. 26 and 27.—Fig. 26, front view, dental arches to be equalized. Fig. 27, profile view, arches to be equalized.

and the ramus, it gradually becomes more nearly a right angle about the adult period or later but, as one advances in life, the angle of the mandible again becomes more obtuse.

In equalizing the dental arches, anteroposteriorly to any extent, there are always changes taking place in the shape of the mandible, principally at the location of the angle, caused by the necessary intermaxillary force. These changes for the purpose of improving the occlusion and relationship of the dental arches will later be more fully presented in this paper.

It is essential that all details of this movement and changes caused by equalizing the arches be understood by the operator. It is important to him in the diagnosis, the laying out of a general plan of treatment and indicating in the different stages the best method to pursue; as an example, when the mandibular arch has distal occlusion, with the incisors antagonizing with the gum just back of the maxillary incisors, or in a case with moderate distal occlusion. This condition has been successfully treated by utilizing a lingual metal shelf attached to the arms of an appliance, depressing the lower incisors through the normal occlusal (Fig. 30) and, at the same time,



28 29

Figs. 28 and 29.—Fig. 28, front view, improved features by treatment. Fig. 29, profile view, improved features by treatment.

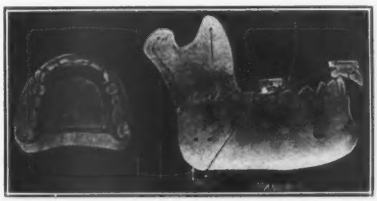
this force generally changes the angle of the mandible by the continued use of the shelf. The shelf is shaped to fit the lingual curve of the incisors, and to project backward enough so that the lower incisors and cuspids when in occlusion, would rest upon the shelf, not permitting the molars and premolars to occlude.

In such a case, the appliance should be well anchored and supported to resist the force in mastication. For the latter, a looped spring wire should be shaped to pass around the tapered cusp of each of the upper canines and to rest near the mesial and distal surfaces, with the ends of the wires extending toward the gum passing underneath the shelf to which

they are soldered. With this arrangement, the shelf is strongly supported being prevented from pressing nearer to the gum and, when the appliance is kept constantly in place, would gradually change the angle of the mandible through the force caused by the action of the mandible in attempted mastication with the six mandibular anterior teeth resting on the shelf in occlusion, with none of the other teeth occluding. The shelf is sometimes made level, but when there is distal occlusion and the arches need equalizing, it is tipped forward more or less so that, when the mandibular incisors and cuspids rest upon the incline of the shelf, they would slide on the incline and draw forward on the mandibular arch. In occlusion this force, in effect, downward and forward on the anterior part of the body of the mandible gradually changes the angle of the mandible causing it to become more obtuse and the body of the mandible to move farther forward, thereby tending toward normal occlusion.

This change in the angle will be better understood by reviewing the plan of the development of the mandible. Examine Figures 1 and 2 with other figures in this article. With the young child the ramus is short and the body of the mandible is short. The body of the mandible in its further development gradually becomes longer from the symphysis to the ramus to accommodate each developing deciduous tooth in its regular order of eruption and continues its development to accommodate each of the erupting permanent teeth in their successive order. The eruption of the third molar seldom occurs before the age of 18 to 21 years. During all of this time the ramus portion of the mandible is undergoing a similar progressive development at the angle contributing to the length of the body and ramus. By this it will be understood that the region at the angle of the mandible is in a constant developmental stage from the beginning of the life of the child to that of the adult and, accordingly, its cellular arrangement during this period is more easily changed by any steady, constant force. This interstitial developmental condition at the angle, permits a ready change to a more or less obtuse angle as desired.

Figure 31 illustrates a model of a mandible arranged to demonstrate the changes that take place in the mandible from the application of intermaxillary force in equalizing the dental arches anteroposteriorly, as by the use of rubber equalizing bands. An equalizing band is shown in the figure extending from the cuspid of the maxillary arch to the first lower molar for that purpose. It will be



30 31

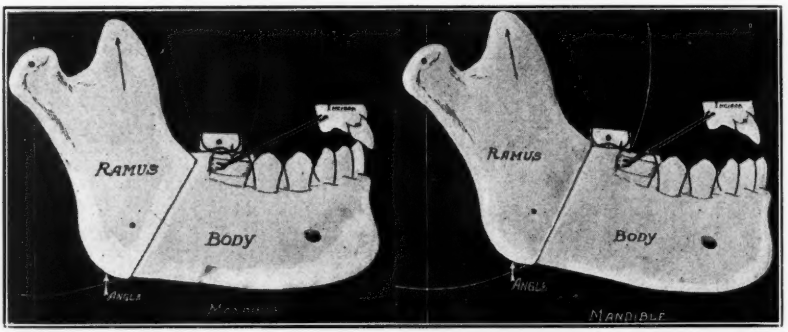
Figs. 30 and 31.—Fig. 30, bite-plane for depressing elevated incisors and cuspids by occlusal force. Fig. 31, model demonstrating changes in mandible from application of intermaxillary force, lower incisors antagonizing with the gum far back of the upper incisors.

noted that the case is one of distal occlusion with the lower incisors antagonizing with the gum far back of the upper incisors. This and the following figures are to demonstrate that the change in equalizing the dental arches from distal occlusion to normal, does not establish a new temporomandibular articulation, as has been thought, but that it bends the mandible at the angle, which results in causing a more obtuse position of the ramus in its relation to the body of the mandible. This bending of the mandible for the correction of the occlusion is brought about by moderate constant force of the equalizing bands, following the laws of force "as a slight constant force

will cause the softening of a bone, while an interrupted force as first pressure and then relief, causes the strengthening and development of a bone."[2]

It will be seen that the first maxillary molar and the upper central incisor represent the upper arch, with the lower incisors antagonizing with the gum back of the upper incisors. The very difficult problem that we were discussing represented with the bite plane, shows that, as occlusal force was applied, it brought about depression of the incisors, and that with the process of equalizing the dental arches as shown.

The forward traction on the molars acts on the lower end of the ramus while at the same time, the sustaining-muscles are put on the stretch in holding the condyle of the ramus in its proper occlusion. Through these two constant forces, the angle of the mandible is gradually caused to become more obtuse, which lengthens the mandible from the condyle to the symphysis permitting the teeth of the body of the mandible to rest in normal



32 33

Figs. 32 and 33.—Fig. 32, model of mandible with ramus more obtuse, and body of the mandible moved forward, the incisors and molars occluding normally. Fig. 33, model of mandible showing prognathous condition from excessive intermaxillary force.

the proper incline of an occlusal plane, the lower arch in certain cases, would be forced forward to a normal occlusion through the changes at the angle of the mandible. In all of these cases, as the ramus becomes more obtuse, the body of the mandible takes an advanced position, or becomes more prominent in its relation to the upper arch. This, as we have determined, is occasionally accomplished by the use of a bite-plane, but the logical method of bending downward the front part of the body of the mandible and making it more prominent, is through occlusion both with the molars and the incisors.

As stated from this constant traction of the intermaxillary force, the ramus is made more obtuse, with the body tipped downward and, it will be noted that, as the body is drawn further forward with the maxillary and mandibular teeth in occlusion, it cannot go to a higher level but with the changes in the mandible, the lower end of the ramus has reached a higher level and the front part of the body with the teeth are resting more prominent in normal occlusion (Fig. 32). These latter changes are what we usually

[2]Jackson, *Orthodontia*, 118.

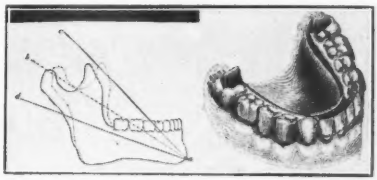
seek for in the process of equalizing the dental arches.

If the same equalizing force should injudiciously be continued too long and the angle of the ramus become abnormally obtuse, the body of the mandible would become still more prominent and by this added change of the angle, it may cause a prognathus condition (Fig. 33), which usually is accompanied with lack of anterior occlusion of the teeth. As stated, this condition is not infrequently brought about by the overuse of the intermaxillary force in equalizing the arches. When this prognathous condition exists with abnormal occlusion of the teeth, for its correction, it is treated by reversing the intermaxillary force, that is, extending the equalizing bands from the mandibular canines to the last maxillary molars, but in true prognathism, additional force with a chin cap and cranial cap, should also be employed.

Figure 34 is an illustration of the principle for the reduction of a prognathous mandible through the bending of the mandible at the angle. Intermaxillary force by the equalizing band should be applied as described, and at the same time, in addition, a chin cap and a cranial cap should be employed. There are many phases of this subject that would be interesting if presented.

In Figure 35 is shown a lower device that has been used for sustaining the mandible in its new position after being reduced from the prognathous condition. The appliance has two ascending planes, one on either side of the arch, projecting upward from the crown of each of the last erupting molars, passing back of the last maxillary molars for retaining the teeth and the mandible.

This apparatus is effective in some classes of cases but is not as sure and effective as an appliance with palatal or lingual equalizing posts, which the author has described in previous writings.



34 35

Figs. 34 and 35.—Fig. 34, the lines of force required for the correction of prognathous mandible. Fig. 35, lower apparatus with projecting parts upward to engage with maxillary molars to serve as anchorage for prognathous case.

Discussion

Martin Dewey, New York City: We are all aware that the orthodontic world has been divided over the fixed and removable appliances. Each type has its advantages and disadvantages. A few years ago Dr. Eby made the statement that ultimately all appliances would be of a fixed removable type. In following Dr. Jackson's work we will remember that his early appliances consisted largely of loops which slipped over the teeth, and that there were very few bands. Now he has added bands, or collars as he calls them, and in using these collars his removable appliance has become almost a fixed appliance so far as the patient is concerned. The others have taken Dr. Jackson's appliance and have constructed locking devices whereby the lingual appliance can be removed by the operator quite easily without removing a large number of screws and pins, as was formerly necessary. So these two principles are coming together and the future plan will probably be to construct an appliance which will be both hygienic and easily handled.

THE MECHANICS OF SPHERICAL ARTICULATION

By JOHN WALTER NEEDLES, A.M., M.D., D.D.S., Pueblo, Colorado

(Read before the National Society of Denture Prosthetists, Milwaukee, Wisconsin, August 1-13, 1921)

THE purpose of this paper is to demonstrate the correctness of the theory that the teeth in normal occlusion lie upon the surface of a sphere as advocated by Dr. Geo. S. Monson or more generally that the two sides lie upon the surface of concentric spheres. Any deviation from this condition produces a certain degree of malocclusion resulting in the loss of contact of some of the teeth in some of the occlusal positions. If this theory is true, there is a transverse axis through the head of the condyles about which the opening and closing motion takes place. And there is a center for lateral and protrusive motions located at the center of the sphere.

We may then compare the upper and lower jaws to a mortar and pestle in which the mortar is a spherical cup and the pestle has a spherical surface of the same radius. It is plain that these surfaces might rotate about any axis through the center of the sphere and always remain in contact throughout their surfaces and any spherical surfaces that were concentric with them would also remain in contact. The lower jaw might be likened to a plumb bob supported at a point; if pulled to one side it will swing back through the arc of a circle. The plane of the circle is perpendicular to the axis of rotation. I will endeavor to show that such conditions are found in the human jaw.

In order that we may agree upon the anatomical conditions that exist in the mandibular joints, and the known facts concerning the form of the occlusal surface, so-called occlusal plane, and the mandibular movements the first part of the paper will be largely a review of the work of various authors.

Figure 1.[1] The glenoid fossa is located on the under surface of the temporal bone with its concavity directed downward. The anterior portion covered in the recent state with a dense fibrous tissue constitutes the articular portion sloping downward and forward to the eminentia articularis. The inclination of this surface varies with different individuals. Figure (a) of Chart 3 shows the head of the condyle, the fibrocartilage and the two synovial sacs. The other views show the ligaments.

Figure 2. If a curved line be drawn touching the summits of the buccal cusps of the upper teeth from cuspid to third molar it will more or less accurately correspond with the arc of a circle. The mesial cusp of the first molar marks the lowest portion of the curve. This is the compensating curve or the curve of Spee. If continued backward it will generally pass through the condyle.

Figure 3.[2] Another view showing the curve of Spee and the inclination of the teeth toward the median line.

[1] George H. Wilson, "The Anatomy and Physics of the Temporomandibular Joint," *Jour. Nat. Dental Assoc.*, (May, 1920), 418.

[2] *Amer. Text Pros. Dent.* (1913), 224-225.

Figure 4. A drawing of Bonwill's showing the relation which almost always exists between the length of cusp of the posteriors and the overbite of the anteriors. I believe that this is a very fundamental condition and that it is fulfilled in the spherical method of articulaton. As will be seen, the crescent-shaped area is produced by the rotation of the arc about a center at the head of the condyle, a pure opening and closing motion.

Figure 5. Lateral view of the skull.

Figure 6.[3] Illustration from Dr. Wilson's article, shows curve of Spee and parallelogram of force.

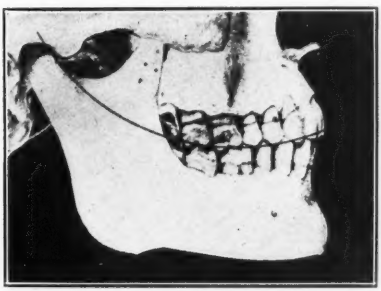


Fig. 2

Figure 7. Illustrations of orthodontic casts of Dr. Angle's showing occlusal curve before and after regulating. The corrected case shows teeth arranged on the arc of a circle of greater radius, and suggests the use of a spherical articulator and spherical measurements in orthodontia. A somewhat casual study of this phase of the subject leads me to believe that the spherical theory offers a very promising method of study for diagnosis and treatment of such cases.

Figure 8. Shows a lateral and basal view of an edentuous skull. It will be observed that the space between the upper and lower ridges is nearly parallel. The occlusal surface must have been about half way between the ridges, which fact is made use of in finding the center of the sphere. It also suggests a means of deciding when the bite is open, the right amount which I have found helpful. It is very apparent that if the jaws were closed a little more, the space at the back would be greater than in front and if open a little more, the space in front would be the greater. With uniform absorption it has been my experience that the ridges are nearly parallel when the mouth is open the right degree.

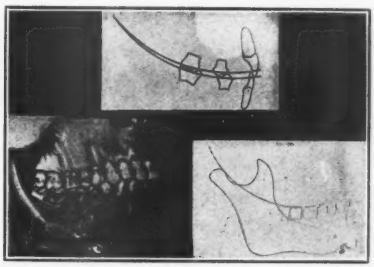


Fig. 4

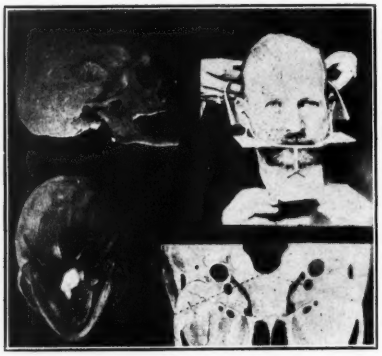
Figure 9.[4] A lateral view of a child's, an adult's and an edentuous patient's mandible. In mounting the models of a child I discovered that the curve of Spee is of practically the same radius as that of an adult. There is some evidence that there is a developmental reason why this condition exists. The following observations upon the growth of the jaw seem to indicate that the line of growth is along the curve of Spee. There is no abrupt change in this curve produced by the eruption of the permanent molars, but they come into occlusion upon the curve distally to the temporary molars. This continues the curve backward. The condyle also grows backward and upward and outward along this same curve, thus making the angle formed by the body and

[3]George H. Wilson, "The Anatomy and Physics of the Temporomandibular Joint," *Jour. Nat. Dental Assoc.*, (May, 1920), 416.

[4]Amer. Text Book, Figure 219.

ramus, approach more nearly to a right angle.

The permanent bicuspids and cuspids together occupy about the same space as the temporary teeth which they replace, therefore no growth is necessary in this region. The permanent anteriors come outside the curve of the temporary teeth which gives some additional space. In addition to this the temporary teeth separate, affording the rest of the space necessary for the larger permanent teeth.



Figs. 8 and 10

The areas where growth is necessary are in the anterior part of the jaw, near the angle and near the condyle. Centers of ossification are located in approximately these regions. Growth in the front of the mouth makes the sides of the arch more nearly parallel; that is the chin is more square. Growth at the angle and condyle makes the angle of the jaw more square by extending farther around the curve of Spee. If the teeth require more room it can be obtained by arranging them upon the surface of a larger sphere. This results in flattening the curve of Spee, the curve of the anterior teeth and also lessens the inclination to the median line.

Figure 10. An illustration from Prosthetic Dentistry showing the path of the symphysis in a transverse vertical plane, also tracing of the condyle path in an oblique transverse plane. The path of the symphysis which is similar to that of the incisal path is composed of two lines which meet in an angle in the median line and slope downward and outward from that point. The condyle path is also composed of two lines of unequal length forming an angle with each other. The longer line slopes downward, inward and forward. The shorter one may go either forward and outward directly outward or outward and backward as the

Figs. 11 and 14

case may be. The lower half of the illustration shows a basal view of the skull and shows that a plane tangent to the articular surface of the glenoid fossa would intersect the one from the opposite side near the median line at the anterior portion of the foramen magnum.

Figure 11. The lower illustration shows tracings of the condyle and symphysis in planes parallel to the sagittal plane. The condyle path as here shown is downward and forward.

Figure 12.[5] Shows tracings of the incisal path in the occlusal plane. As here shown, the incisal point is confined to a triangular area which we may consider as an envelope of its possible positions. The two anterior sides of the figure meet each other at a distinct point which is the central or rest position of the incisal point.

[5]Amer. Text Book, Figure 353.

Figure 13.[6] Here the tracings of the right and left condyles are shown in sagittal projection. The method of determining the angle to the occlusal plane is also shown.

Figure 14. This illustration shows Gysi's classification of the condyle paths. He groups them into four types of paths as shown at the top. The middle portion of the paths is the part which is in use while the teeth are in contact and it can be seen that this part of the tracings are almost identical in form, being a slightly curved line which might form part of the surface of a sphere of some size.

Figure 15.[7] This figure shows sections through glenoid fossae of several skulls. It is quite apparent that the articular portions of the curves are identical in form to Gysi's tracings and can be parts of spherical curves.

Figure 16.[8] Shows Gysi's method of finding the axis of opening and closing motion. The position determined is downward and behind the condyle.

Figure 17.[9] Shows character of the contact between the cusps on the opposite sides of the mouth.

Figure 18.[10] Drawings showing the influence of the position of the rotation center upon the movements of the mandible.

Figure 19.[11] Another drawing to illustrate the same point.

Figure 20.[12] Shows the influence of rotation points upon the paths of the cusps.

Figure 21.[13] Shows artificial teeth in normal central occlusion and the effect of correctly and incorrectly placed centers of rotation.

Figure 22.[14] Similar to last illustration.

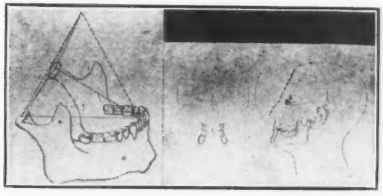
Figure 23.[15] Balancing bite left side.

Figure 24.[16] Working bite left side.

Figure 25.[17] This is an illustration of Dr. Monson's showing pyramid and oblique arc in the plane in which the mandible moves while the left is the working side.

Figure 26.[18] The opposite oblique plane.

Figure 27.[19] Three views of the pyramid and the curve of Spee shown as part of the surface of sphere.



Figs. 30 and 31

Figure 28.[20] Shows the relation of the condyles to the surface of the sphere. Also position of the pyramid and the center of the sphere.

[6]Amer. Text Book (illustration showing both pages 372 and 373).

[7]Amer. Text Book, Figure 175.

[8]Clapp, Prosthetic Articulation (1914), 145.

[9]Amer. Text Book, Figure 205.

[10]Prosthetic Articulation, page 151.

[11]Amer. Text Book, Figures 356, 357.

[12]Amer. Text Book, Figure 350.

[13]Amer Text Book, Figures 360, 361 and 362.

[14]Prosthetic Articulation, Figure 149.

[15]Prosthetic Articulation (all figures on page 127).

[16]Prosthetic Articulation (all figures on page 125).

[17]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 403.

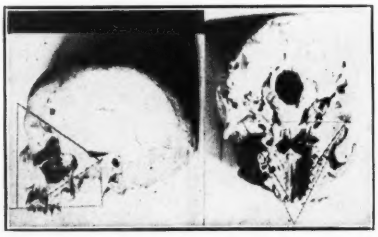
[18]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 402.

[19]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 401.

[20]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 409.

Figure 29.[21] This drawing shows that the axes of the teeth lie in radii of the sphere.

Figure 30. A drawing showing the relation of the pyramid constructed on the Bonwill triangle to the mandible. The pyramid as shown is equilateral but it may have any form and the variation of form determines the shape of face and the form of the occlusion. Studied in this way the face will be seen to be a tetrahedron bounded by two lateral planes and an upper and a lower plane. The angles at which these planes intersect will determine the form of the face.



Figs. 34 and 35

Figure 31. Transverse and sagittal views showing the radial position of the teeth.

Figure 32.[22] Models mounted on Monson's articulator showing the relation of center to the occlusal plane.

Figure 33.[23] An upper model showing the direction in which the cusps of the lower teeth move.

Figure 34. A lateral view of the skull with lines showing the rectilinear coordinates of the incisal point and the glenoid fossa with respect to each other. It is this relation which is recorded in a face bow measurement. The hypotenuse of this right triangle is the plane of Bonwill's triangle. If the articular surface of the glenoid fossa is a portion of a spherical surface the center of the sphere must lie in a plane perpendicular to this surface. This plane would intersect the plane of the drawing in the line going upward and forward from the glenoid fossa. This line is then the locus of the center of the sphere as projected in this drawing. The vertical line is the intersection of two planes shown in the next drawing. The intersection of this line with the oblique line locates the center of the sphere.

Figure 35. Basal view of skull showing the direction of the glenoid fossae in this plane. The lines perpendicular to the glenoid fossae would intersect each other at a point which would be the center of a circle tangent to the two surfaces. This circle could be a part of the surface of any sphere whose center was in the line perpendicular to the plane of the drawing at the center of the circle, provided only that the radius of the sphere was at least as large as that of the circle. This line is the vertical line shown in the last drawing. It is the locus of the center of every sphere which could be tangent to the articular surface of the glenoid fossa. The intersection of this line with the oblique plane described in the last drawing locates the center of the sphere.

Figure 36.[24] This is an illustration from one of Dr. Gysi's recent articles showing his method of determining that the rotation center is at a variable distance posterior to the condyles. It also shows the relation of this center to the paths of the teeth.

Figure 37.[25] Another similar illustration.

Figure 38. This figure shows the tracings of three points on the mandible taken simultaneously. By erecting perpendiculars to each of the curves it is

[21]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 408.

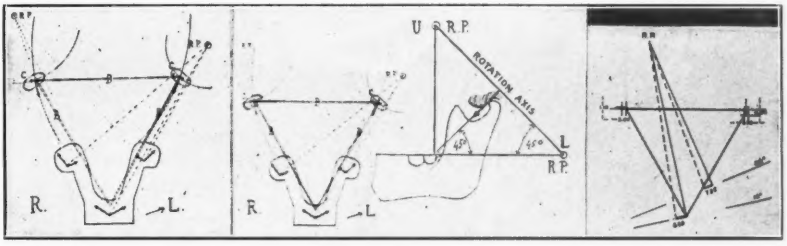
[22]George S. Monson, "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.* (May, 1920), 405.

[23]Original but non-essential.

[24]Gysi, *Digest* (December, 1920), Fig. 16.

[25]Gysi, *Digest* (December, 1920), Fig. 15.

found that they intersect at two points, one in the area posterior to each of the condyles. The incisal tracing will be seen to consist of two lines of about equal length, meeting at an angle, which is typical of this tracing. The tracings in the molar region is composed of two lines of unequal length meeting at an angle. The shorter line is the one on the mesial side of the angle and represents the working path. This line is approximately perpendicular to the line of the arch. The longer line which represents the balancing path is external and takes a direction obliquely outward across the vertical motion to side motion which takes place in this operation is determined by the depth of the cusps of the teeth. This results in a muscle coordination between the two groups of muscles. This is similar to the muscle coordination of the eye which controls convergence and accommodation. The articular surfaces of the glenoid are developed in harmony with the habitual motions of each patient. This limits the possible motions of that patient but within these limits the patient is capable of any ratio between vertical and lateral motion. It is possible, there-



Figs. 38, 39 and 40

arch. I believe that the physics of mastication has a definite relation to these paths.

Mastication consists of two elementary movements. The first of these is a closing or pinching motion which puts the food under pressure. This is accomplished by one set of muscles. After the food is under stress another set of muscles imparts a sliding or side motion to the mandible which results in a shearing or trituration of the food. After the food is grasped between the teeth under stress and a side stress is applied, the teeth will tend to pass each other at the angle of least resistance which will be perpendicular to the line of the arch since the intermeshed cusps on the working side will then pass through the valleys between the opposing cusps without causing relaxation of the vertical stress. The ratio of fore, for a patient to use any steepness of cusp within certain limits. The special form of cusp which is most comfortable is determined by the muscle and innervation balance which the patient has acquired by habit. However the mechanical efficiency of artificial dentures may dictate some modification of this cusp form. The amplitude of the incisal tracing offers a guide as to the character of cusp most natural to the patient. It is apparent that a patient with limited lateral motion would require a steep cusp.

The fact that the path on the working side is shorter than that of the balancing side gives an explanation of why that side is the most efficient for chewing. With the same amount of energy, a greater resistance will be overcome on the side which has the shortest distance to move, that is closer to the fulcrum.

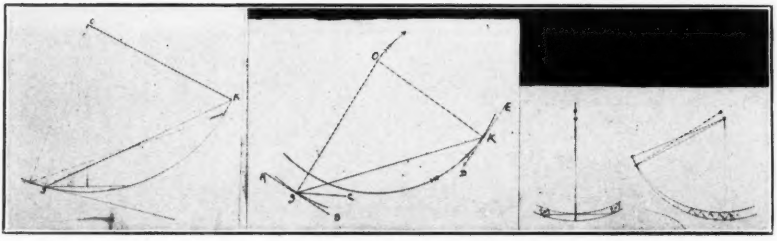
Figure 39. In this illustration is shown a lower rotation point below and behind the condyle and an upper one above and in front of the condyle. These two points are connected by a line which constitutes an axis of rotation. This is the first place that I have seen an axis of rotation mentioned as distinguished from a rotation point. It is possible to oscillate about a point but a rotation must take place about an axis. If this point had been recognized before it would have been natural to have attempted to find the direction of the axis. If this had been done the spherical theory would have been an accepted fact rather than a mere hypothesis. An axis of rotation must be perpendicular to the plane of the motion. If the tracings in the left-hand part of the drawing are in the plane of the motion then the axis of rotation must lie in a plane perpendicular to these tracings and since the axis is an inclined one its directions must be forward upward and inward from the point marked R. P. and would then cross the median line. If the axes from the two sides are understood to intersect, this intersection will be the center of the sphere and the drawings will be in harmony with the spherical theory.

Figure 40. This is a drawing by Dr. Williams showing a rotation point posterior to the condyles and showing the relative motion of the points of Bonwill's triangle.

Figure 41.[26] This is another drawing of Dr. Williams', showing variations in the position of the rotation point and the method of determining the same.

Figure 42. An original drawing, which I wish to develop geometrically. Let one end of the line I-K slide in contact with the tangent to the circle at K and the other end slide in contact to the tangent at I. For a small degree of arc the tangent and arc are co-incident. Therefore it is apparent that the line I-K is rotating around the point O as a center for a small degree of arc.

Figure 43. Let the line at K have one end in sliding contact with the line D-E and the other end in sliding contact with the line A-B. Erect perpendiculars at the points K and I. They will intersect at point O. If the line I-K moves only a short distance it is equivalent to rotation about the point O. The point K will move along an arc with radius K-O, and the point I will move along arc with radius I-O. If the point I moves along the line I-C which is not perpendicular to O-I then the point O will not be stationary but will move along an arc with center at K. We will then have two simultaneous rotations, one about the center at O the other about the center at K. If we let the line I-K represent one side of



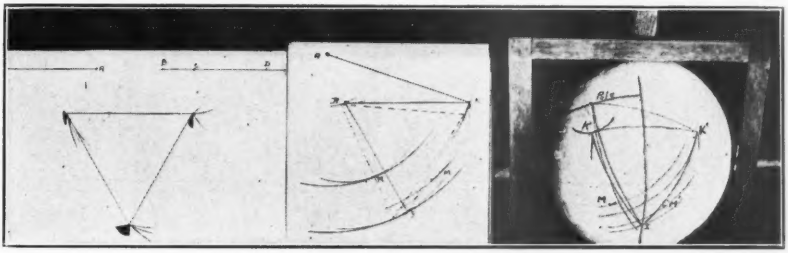
Figs. 42, 43 and 44

[26] J. Leon Williams, "Geometry of Mandibular Movements," *Jour. Nat. Dental Assoc.* (December, 1920), 1009.

Bonwill's triangle, the line D-K-E represents the condyle path and the line I-C represents the under surface of an upper incisor. It is apparent that the drawing represents the conditions found in the mandible and that the movement of the mandible may be analyzed into two component rotations one at the condyle and one at the center of the sphere. The one at the condyle represents opening and closing motion and takes place between the condyle and the fibrocartilage. The other represents protrusion or lateral motion and takes place between the fibrocartilage and the articular eminence.

Figure 45. This drawing represents the envelopes of the paths of the three points of Bonwill's triangle for all the motions possible to one side of the median line. It is a unilateral drawing and illustrates the fact that the rotation point is not a fixed point but may occupy any position along the line B-C-D externally to the point B. In other words the point B is the rotation point of Gysi and represents the most internal position of the rotation axis.

Figure 46. This is a drawing similar to those of Dr. Gysi and Dr. Williams. Let A represent the rotation point and



Figs. 45, 46 and 47

Figure 44. This illustration shows the components of motion in a sagittal and a transverse plane. In each of the drawings the separation between the two arcs represents vertical motion produced by rotation at the condyles. The lateral component is produced by the condyle sliding forward in its path which is equivalent to rotation at the center of the sphere. The resultant of the two is a movement along the inclined lines here shown. In the drawing on the left the working side is to the left and the balancing side on the right. It can be seen that on the working side the direction of the components is such that the shorter diagonal represents the resultant motion, while on the balancing side the longer diagonal is the resultant. This is in harmony with the tracings taken in the mouth.

B, K, I represent Bonwill's triangle. If the triangle is rotated about "A" as a center, the various points shown will trace paths which are arcs about the point A, and all the points will move the same angular distance about the center. The length of path will be proportional to the distance from the center. If all the points were considered as lying in a straight line at their proportional distance from the center they would trace arcs, measured by their radius from the center, and their angular motion about the center which is the same for all the points.

Figure 47. This is the photograph of a sphere, the radius of which is four inches, equal to the intercondylar distance K-K^1. The figure K-K^1-I represents a spherical Bonwill triangle. The sagittal plane is represented by the heavy

meridian shown. The rotation point is represented by the point marked Pole. With this explanation the analogy between this and the last illustration is easily apparent. Rotation of the spherical triangle about the pole gives the paths of the various points as shown. These are all arcs which lie on parallels of latitude. Since the angular motion of all the points is the same, the length of their paths is determined by their latitude or angular distance from the pole. The distance of the pole behind the condyle K can best be determined by measuring the angles at K^1. The line K^1-K is perpendicular to the sagittal plane and to the plane through K^1 parallel to the sagittal plane.

Figs. 48, 49 and 50

The line from K^1 to the pole is perpendicular to the path taken by K^1 in rotation around the pole. The angle K-K^1-pole is equal to the angle at K^1, since the sides of the two angles are perpendicular to each other.

This angle at K^1 in the angle between the path of the balancing condyle and a plane parallel to the sagittal plane. It can be measured in tracings of the condyle path as taken by Gysi's method.

Figure 48. This illustration shows Gysi's tracings measuring this angle which he has determined varies from two degrees to thirty degrees with an average of sixteen degrees. Since the radius of the sphere is in general equal to the intercondylar distance, the pole is on an average sixteen degrees posterior to the condyle.

Figure 49. This illutration shows the trigonometric method of determining the length of path of the various points on the surface of the sphere. Let R equal the radius of the sphere, let θ Theta equal the angular distance of point "1" from the pole then the length of path "1" is expressed thus: $l = \frac{2\pi r x}{360^\circ}$ where (r) is the radius of the circle of latitude of point 1.

$r = R \sin. \theta$ Theta

Therefore $l = \frac{2\pi R^\circ \sin. \theta}{360}$

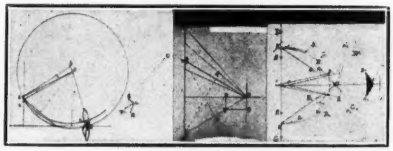
For any given value of (x)

$\frac{2\pi x^\circ R}{360} = A$ constant K

Therefore $l = K \sin. \theta$

When (x) the angle of rotation=4° and R=100 mm. K=7.=The length of arc at the equator.

Figure 50. Shows a table giving the values of the various paths as calculated



Figs. 54, 55 and 56

by means of this formula. If it were possible to measure the paths of any points on the mandible with sufficient accuracy we would calculate the position of the rotation point or pole.

Figure 51.[27] This is a photograph showing the relative position of the rotation axes and the paths of several points on the mandible.

Figure 52.[28] Another view of axes.

Figure 53.[29] Another view.

Figure 54. This is a drawing showing the application of the spherical principles to the construction of an articulator. The incisal motion is composed of two components, a retrusive motion and a closing motion. The retrusive motion is produced by the slide of the condyle on the

[27]Original but non-essential.

[28]Original but non-essential.

[29]Original but non-essential.

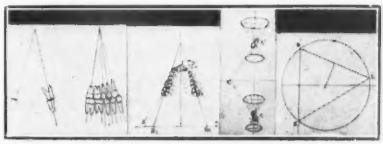
articular eminence and is equivalent to rotation at the center of the sphere at O. The closing motion is rotation around the inter-condylar axis at C.

The two simultaneous motions give a resultant center of motion which is the axis of the incisal motion and is located downward and behind the condyle as shown by Gysi. This is illustrated in the small drawing to the right of Figure 1. If the condyles move from O^1 to C which is rotation about O and then rotates about C through the angle A-C-RC, the resultant change of position is the same as if the mandible slid down the inclined condyle path parallel to itself and then rotated back through the angle A-C-RC, which is equivalent to rotation about point RC, as shown in the angle C^1-RC-C Figure 1.

Figure 58. This drawing is intended to show that rotation about any axis passing through the point O and lying in the plane of the drawing may be resolved into two components of rotation about the axes of a universal joint at the point O. Assuming that the rotation centers are at the condyles and connecting these points with the center of the sphere we have an isosceles triangle or an equilateral triangle. The line RC-LC will represent the axis of opening and closing motion, and the lines RC-O will represent the axis of rotation of the mandible when it moves to the left of the median line with the rotation center in the right condyle. The left condyle will then drop below the plane of the drawing. The projection of this path will lie along the line LC-E which is a perpendicular from the point LC to the axis of rotation. Similarly when the mandible moves to the right with the left condyle as the center of rotation, the line LC-O, connecting the left condyle with the center of the sphere, is the axis of rotation and the projection of the path of the right condyle lies along the line RC-F.

Rotation around these oblique axes may be resolved into rotation around two axes at right angles to each other lying in this plane with their intersection at the point O. The axis C-A is the perpendicular from the point O to the intercondylar axis, RC-LC. The axis OD is parallel to the intercondylar axis, and lies in the plane of the triangle.

The rotation centers may not lie in the condyles but lie at any point farther away from the median line than the condyle and may be a short distance inside the condyles as demonstrated by Gysi. In fact this rotation point is a variable point moving back and forth along the intercondylar axis. The point which is usually called the rotation center is the inward limit to which this point may move, but it may occupy any position ex-



Figs. 57, 57, 58 and 59

ternal to this. Therefore the rotation axis is a variable axis as shown in the upper half of the drawing. Rotation about any of these axes may be resolved into rotation about the axes of the universal joint. This description is true when the rotation centers are in the condyles. If the centers are behind the condyles, the plane of the universal joint must pass through the rotation centers instead of the condyles. This condition results in a lateral motion at the condyles which has been demonstrated to occur in nature but is not produced when the rotation center is in the condyle chord.

Figure 56. This illustration is to show that the incisal tracing is an envelope of all the possible positions of the incisal point produced by rotation about any of the varying rotation axes. This drawing assumes that the rotation centers lie in the intercondylar axis. This condition does not materially change the incisal path but does not give the true paths of

the condyles. If varying points along this line external to A and B are taken as centers and arcs described through the point I, it will be seen that they intersect at I forming an angle. It will also be seen that the areas described from points A and B as centers lie external to the other arcs forming the outer boundary of the triangular area containing the other arcs. If the center were at infinity the path would be parallel to the sagittal plane and would represent the path of straight protrusion. The darkened triangle represents all of the possible positions of the incisal point or in mathematics an envelope.

If the rotation center lies inside the condyles one condyle must move backward when the other moves forward. With the condyles in the position of central occlusion there is only a very limited backward motion possible. The possibility of this backward motion then determines how far internally the rotation center may be. If the rotation center is outside of the condyles, both move forward at the same time in proportion to their distance from the center. The farther the center is from the median line the more nearly equal is the motion at the condyles. By a slight protrusion of the mandible it is possible to have the rotation point in the median line since it is then possible for one condyle to move forward while the other moves backward.

Figure 57. Shows the geometrical relations that exist and are similar to drawings of Drs. Monson and Gysi. The longitudinal groove in molars and bicuspids lies approximately in a plane from the cuspid tooth to the rotation center of the same side. The distobuccal groove of the lower molars lies on an arc formed by rotation about the opposite rotation center. The mesiobuccal groove and the lingual groove lie on an arc formed by rotation about the rotation center of the same side. As a consequence in the working bite the teeth cross each other at a right angle to the line of the arch on that side which is the angle of least resistance. In the balancing bite they cross each other at an acute angle to the line of the ridge. The anterior teeth in working bite also cross each other almost at a right angle to their arc while in balancing bite they move along this arc.

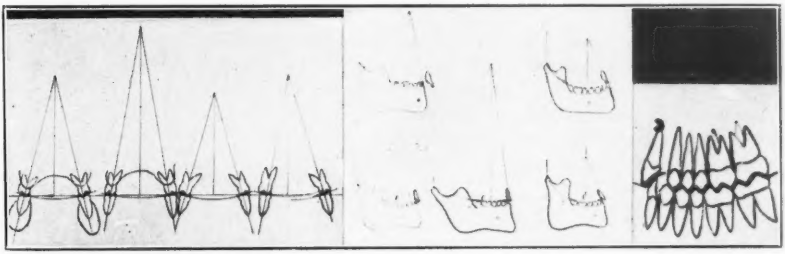
If the molars and bicuspids lie in a plane passing through the center of the sphere the curve of Spee has the least curvature possible for a sphere of that radius, since it lies on an equitorial circle. The pitch toward the median line is also least when this condition exists. The long axis of a tooth must lie in a radial line from the center of the sphere of oscillation, otherwise there will be lateral stress in mastication which will tip the teeth out of alignment. That is it will produce a progressive malocclusion. Is not all malocclusion progressive due to the fact that the center of symmetry does not coincide with the center of oscillation and center of stress? The convergence of the axes of the upper and lower teeth to a common center and the direction of stress causes the greatest pressure to be on the lingual cusps of the uppers and the buccal cusps of the lowers. As a result these cusps are most often broken and their correct occlusion is the most important. The shearing effect takes place as a result of the lingual slope of the buccal cusps of the uppers sliding over the buccal slope of the buccal cusp of the lowers, that is the surfaces which slope toward the groove of the uppers articulate with the inner and outer slopes of the buccal cusp of the lowers. The inner cusp of the lowers serve mostly in the retention of the food in the groove. The upper molars are braced against the tipping strain by the palatal roots. The lowers have the heaviest plate of bone on the outside. This arrangement results in the greatest resistance being opposed to the greatest stress. The lateral motion is a shearing motion, the closing motion is a crushing motion.

Figure 58. This is a drawing through the condyles and shows that if the condyle chord is the axis of opening, the

condyles since they do not lie in this line must describe either a conical or a double conical surface.

Figure 59. A drawing in the plane of Bonwill's triangle, demonstrating that regardless of the form of the triangle, that the center of the circumscribing circle always lies on the perpendicular to the condyle chord at its center, and the center of any sphere which can pass through K K^1 and I, must lie in the plane perpendicular to the condyle chord at its center. Therefore, the universal joint of the articulator must lie in this plane.

Figure 60. This illustration shows the variation in the inclination to the median line resulting from variations of the radius of the sphere.



Figs. 60, 61 and 62

Figs. 63, 64 and 65

Figure 61. Variations in form of mandible due to variations of radius.

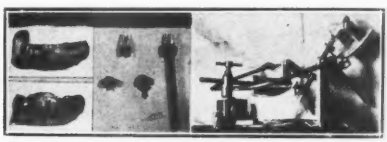
Figure 62. Photograph of mechanical model showing that incisal motion is produced by combined rotation at center of sphere and at condyle.

Figure 63. Another view of same model showing tips of cusps in contact but incisors still overlapped, due to disproportion between height of cusps and overbite of anteriors.

Figure 64. View showing extreme incisal position with balance on second molar obtained by use of excessive cusp.

Figure 65. This illustration shows the components of motion in the same plane on the working and balancing sides.

Figure 66. Upper and lower impressions with a full bite rim on each. This method of taking the closed mouth impression under biting pressure obviates any possibility of distortion of one impression while taking the other, which is possible if both impressions are in the mouth at the same time. A reasonably correct bite is also obtained which gives the measurements by which the lower bite rim is carved. Projecting from the lower impression are two pins which serve to attach the slip joint stem of the face bow.



Figs. 66, 67 and 68

Figure 67. Slip joint stem and conical points for attaching it to lower impression.

Figure 68. The first step in adjusting articulator is to mount lower model with a face bow so that the occlusal plane is approximately parallel to the base.

Figure 69. It has been shown by Dr. Monson that the curve on which the teeth are arranged has a radius approximately equal to the side of Bonwill's triangle. Dr. Geo. Wilson, by an extensive series of measurements on mandibles, also comes to the conclusion that the radius of the curve of Spee has an average value of four inches but that it varies both ways from this average. This being true, Bonwill's triangle will have the same altitude as the triangle formed by lines connecting the condyles with each other

Figs. 69, 70 and 71

and to the center of the sphere. In adjusting the articulator, if the upper arm is bent forward, the center of the universal joint may be adjusted to be opposite the incisal point. This makes the altitude of the two triangles equal. This is the position here shown.

Figure 70. If the articulator is now adjusted by means of the incisal pin and the incisal guide block so that the center of the universal joint will be in a plane vertically above the deepest point of the curve of Spee it will be adjusted approximately in the correct position. This adjustment is sufficiently accurate so that if the teeth are set up in balanced occlusion by the usual methods the results will be highly satisfactory. However, a more accurate adjustment is possible and one which affords a new method of taking the bite with a greater degree of accuracy than by other methods. The curve of Spee and the inclination to the median line are also automatically determined by this method, greatly simplifying the arrangement of the teeth. The approximate adjustment of the articulator is shown in this slide. The position of the pyramid is also shown. The point O is the center of the sphere and is perpendicularly above the lowest point in the curve of Spee. The lines A-O and A-I are the altitudes of the two triangles and are equal. The lines O-I, O-K and O-K^1 are radii of the sphere.

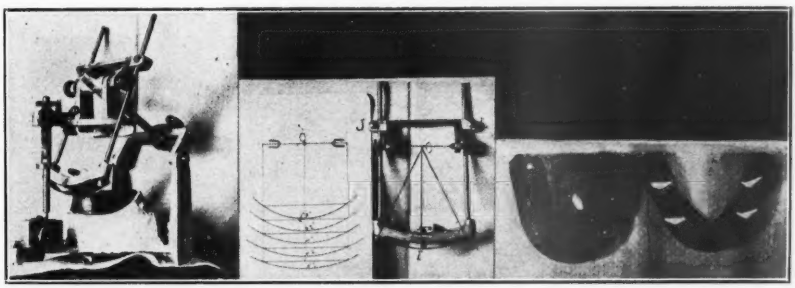
Figure 71. If we have a case in which the absorption is complete in all parts of the mouth we may assume that there has been as much absorption above as below therefore the occlusal surfaces of the teeth should be about half way between the ridges in all parts of the mouth. If we measure on a bite rim the distance from the upper to the lower ridge in the position of the cuspid, the second bicuspid and second molar and take half of each of these distances we have the respective distances at which the occlusal curve should pass above the lower ridge. Since one circle and only one can pass through three given points in a plane these three points will accurately determine the position of the center of the sphere.

Figure 72. The accurate determination of this center is possible by means of an arcuate knife which swings on its diameter. The knife is so made that its diameter is an axis which passes through the center of the sphere. The knife when swung upon this diameter will carve a spherical surface. If we take the distance O-I as the radius of the sphere and warp the knife to a circle of this radius and then adjust the knife on the articulator so the blade passes through the incisal point, the knife and articulator will be approximately adjusted. If the blade swings too far from the heel of the model, the center of the universal joint must be carried backward either by raising the incisal pin or shortening the upper arm of the articulator or by both means. If the blade swings too close to the heel the center must come forward, by shortening

the incisal pin or lengthening the upper arm or both. If the blade swings at the right distance at the front and at the heel but is too near the model in the center the universal joint must be raised directly upward. This is done by lengthening both the incisal pin and the upper arm of the articulator. The curvature of the knife and the side arms must be adjusted to correspond to this change. This produces an increase in the radius of the sphere and a flattening of the curves. The lowering of the center is accomplished by the reverse process and results in making the sphere smaller with sharper curves.

with the usual precautions. The ridges which overhang the lower bite rim should be trimmed off even with the surface leaving a spherical surface on the upper bite rim. If the adjustment has been correct the patient can move the mandible into all possible positions and still have the bite rims in contact throughout their whole surface. They will also be stable and balanced in all positions.

If it is found that the upper bite plate is dislodged in protrusive or lateral bite it means that the curve of Spee is too flat and the center of the sphere should be lowered and a new surface carved on



Figs. 72, 73 and 74

The illustration shows the knife and articulator ready to carve a spherical surface upon the lower bite rim. The bite is opened by screwing down the fine adjustment of the incisal pin and the blade is fed down by screwing the pin back to its original position with the top even with the guide. A bite rim so carved should have all the characteristics of the occlusal surface of the lower plate.

At this stage it is placed in the mouth to see that it has the proper height in all places and also to see that it is parallel to the line of the eyes and that it has the right direction from front to back. It may be corrected in any of these points by the proper adjustment of the articulator. When the lower bite rim is correct, we prepare an upper base plate with a compound bite rim and take the bite

the lower bite rim and the bite taken again.

If the lower bite rim is dislodged the center of the sphere is too low and should be corrected in a similar manner. These conditions rarely happen however.

Figure 73. Shows a view of the knife and a chart for adjusting the curvature of the blade.

Figure 74. When we have obtained upper and lower bite rims which are balanced in all positions imbed four wires in the upper bite rim in the position of each cuspid and second molar. These must be imbedded deeply so as to be firm and cut off leaving a sharp point of about a millimeter exposed. The bite rims are returned to the mouth and the patient instructed to close without pressure until the points are just in contact with the

lower rim. He is then instructed to make forward and backward movement of the mandible barely keeping the pins in contact. By continuing this movement a tracing is obtained in the median line. When we are sure that the mandible is back in central position have the patient slide to one side, then from central position to the opposite side. After the patient understands what is wanted he may be instructed to continue to slide the mandible into all the positions of mastication until the plates move freely in every direction and have cut paths to the full depth of the pins. We will then

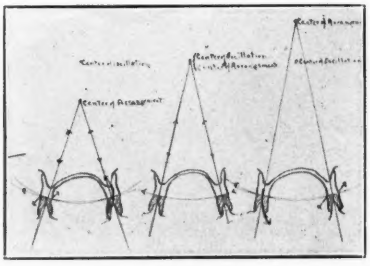


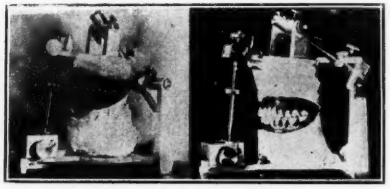
Fig. 76

have tracings on the lower rim similar to the ones shown. When the pins are in the anterior angles of their respective tracings the plates will be automatically locked in central occlusion. When the pins slide in contact with the anterior edges of the tracings the plates will be moving in the habitual angle for that patient.

By means of this bite the upper model is attached to the upper bow of the articulator. After the plaster has hardened loosen the screw which secures the incisal guide plates. Move the upper model to one side of the center, keeping the pins of the upper bite rim in contact with the anterior edge of the tracing, and adjust the incisal guide plate of that side so that it is in contact with the side of the incisal pin. Do the same thing on the opposite side, and fix the plates in this position by means of the screw. Verify this adjustment by moving from central to lateral positions and seeing that pins slide against the anterior edge of the tracing and that the incisal pin slides in contact with the edge of the incisal guide plates.

The inclination plane is adjusted to give the angle of cusps which we are using or the angle of overbite of the anteriors. With natural teeth it is set to correspond to the angle of the natural cusps.

Figure 75.[30] This is a photograph of a double tracing. One set of tracings is made with the rotation centers in the condyle chord, the other with the rotation centers 16 degrees behind the condyle.



Figs. 77 and 80

On the working side the tracings are practically identical but on the balancing side the tracing, when the center is behind the condyle, diverges more from the median line.

Figure 76. This illustration shows the method of testing the radius of the curve of Spee and the sphere. If center is too high the upper plate is unstable, if too low the lower plate is unstable.

Figure 77.[31] Shows casts mounted with bite plates in position.

Figure 78.[32] Articulator adjusted with casts in position.

Figure 79. The upper teeth by this method are set in occlusion with the lower bite rim keeping the proper position over the ridge but with all the cusps in contact with the spherical surface of the

[30]Original but non-essential.

[31]Views of casts mounted on my articulator.

[32]Views of casts mounted on my articulator.

bite rim. This automatically gives the proper inclination to the bicuspids and molars to maintain a balanced occlusion.

Figure 80. The lowers are then occluded against the uppers in their proper relations. It is not necessary to pay any attention to a balanced occlusion as this will be obtained automatically but it may be tested at any time. The teeth are tried in the mouth for final test of occlusion and to see the esthetic effect.

Before removing the plates for vulcanization it is necessary to either take an impression of the occlusal surfaces of the upper plate by placing plaster on the lower part of the articulator or to take a face bow measurement of the lower plate so that they may be readjusted in the same position on the articulator for grinding. In either case a test bite is taken after vulcanizing to adjust the second plate. The occlusion is ground with carborundum powder and glycerin. The only grinding that is done on the teeth is done at this time and generally takes from ten to twenty minutes.

Summary and Conclusion

It is nature's intention for the teeth to come into occlusion upon the surface of a sphere, but, while irregularities of development and loss of teeth modify this condition, the jaws develop in harmony with such conditions at all times and undergo compensatory changes. Unequal eruption of the teeth and assymmetry often result in a tipping of the occlusal plane. The teeth may then lie upon the surfaces of several concentric spheres.

The fundamental conditions are an axis of opening and closing which passes through the condyles; a center of oscillation which bears a definite relation to the surfaces of the teeth, to the axis of opening, and to the surfaces of the glenoid fossae which are characteristic for the individual. Each person has certain axes of rotation (due to the position of muscular attachment and the form of the articular surfaces and the arrangement of the teeth) which are habitual.

Bibliography

Clapp, George Wood. Prosthetic Articulation, 1914.

Gysi, Alfred. "Some Essentials of Masticating Efficiency in Artificial Dentures," *Dental Digest,* November, 1920.

Hall, Rupert E. "Movements of the Mandible and Efficient Restoration," *Jour. Nat. Dental Assoc.,* August, 1920.

Monson, George S. "Occlusion as Applied to Crown and Bridge-Work," *Jour. Nat. Dental Assoc.,* May, 1920.

Turner, *Amer. Text Book of Prosthetic Dentistry,* Chapter IV, "Anatomy."

Turner, *Amer. Text Book of Prosthetic Dentistry,* Chapter X, "Measurements and Articulation."

Williams, J. Leon. "Geometry of Mandibular Movements," *Jour. Nat. Dental Assoc.,* December, 1920, and *Dental Digest,* May, 1921.

Wilson, George H. "The Fundamental Principles of Artificial Denture Construction," *Dental Cosmos,* July, 1921.

Wilson, George H. "The Anatomy and Physics of the Temporomandibular Joint," *Jour. Nat. Dental Assoc.,* May, 1920.

DENTAL SURGERY IN ARTHRITIS

By MATTHEW F. EUSTERMAN, D.D.S., Rochester, Minnesota

THE discouraging results following dental surgical interference in certain particular types of arthritis make the procedure doubtful in many instances. Three factors may be attributable to such results: (1) Foci other than the teeth were not recognized; (2) diseased tissue and bone often remain following the simple extraction of teeth; (3) types of arthritis with hypertrophic changes do not respond favorably to the removal of foci.

According to Barker's classification, the chronic type of arthritis, in which the soft parts surrounding the joints are involved without destructive change, are favorable for the removal of foci of infection.

The cases in the series under observation were divided into two groups. So far as possible the cases positive to the roentgen ray were selected. The degree of involvement was not considered, as the object in compiling the data was to determine the percentage of instances, in which relief followed the removal of teeth and tonsils, and to study the comparative results in cases in which the alveolotomy operation was performed, and those in which the teeth were simply extracted.

GROUP 1

Patients	20
Males	14
Females	6
Average age of males	43
Average age of females	34
Average duration of symptoms (years)	3.5
Average number of pulpless teeth in each patient	6
Patients with impacted teeth	3
	Patients
Pyorrhea Grade 1	4
Pyorrhea Grade 2	6
Pyorrhea Grade 3	1
Normal gums	9
Tonsils removed	7
Tonsils negative	3
Tags	2
Pus with plugs	8
Arthritis positive to roentgen-ray	18
Arthritis negative to roentgen-ray	2
Advised to have foci cleared up	20
Advised to have medical treatment	4
Advised to have goiter removed	1
Advised to cease occupation	1
No relief after one year	3
Absolute relief after one year	8
Marked improvement after one year	9

The twenty patients in this group were operated on in 1919. All foci that were believed to be contributing factors were removed. Tonsils were removed cleanly and infected teeth removed by alveolotomy. Three patients failed to improve, but favorable results were not expected, the foci being cleared up as a prophylactic measure with the hope of affording some relief from pain. One patient was a locomotive engineer who was advised to cease work; one had extensive involvement of the joints; the third was being treated for goiter. Letters of inquiry were sent to patients one year after the removal of foci.

GROUP 2

Patients	36
Males	19
Females	17
Average age of males	40
Average age of females	36
Average duration of symptoms (years)	2
Average number of pulpless teeth in each patient	5
Patients with impacted teeth	5

	Patients
Pyorrhea Grade 1	11
Pyorrhea Grade 2	8
Pyorrhea Grade 3	2
Pyorrhea Grade 0	13
Mouth negative to infection	2
Remaining roots	4
Residual infected areas	1
Tonsils removed	15
Tonsils negative	3
Tonsils questioned	3
Tags	2
Pus with plugs	13
Arthritis positive to roentgen-ray	29
Arthritis negative to roentgen-ray	7
Advised to have foci cleared up	16
Advised to have foci cleared up and medical treatment	11
Advised to have foci cleared up and braces	3
Advised to have general treatment	3
Prognosis from removal of foci, poor	3
No relief after one year	8
Slight improvement after one year	10
Subsided after one year	5
Temporary relief after one year	4
Absolute relief after one year	5
Marked improvement	4

The thirty-six patients in this group were operated on in the year 1919. According to letters of inquiry mailed one year later, all foci were removed as advised, although teeth were removed by the simple extraction method. Three of the four failures in this group may be attributed in one instance to chronic constipation, and in two to extensive destructive arthritis.

Conclusions

1. It is justifiable to advise tonsillectomy and eradication of most pulpless teeth in every frank case of arthritis.

2. Marked improvements may within reason be assured from removal of foci in cases of chronic arthritis with involvement of soft parts around joints.

3. The size of the tonsil or the degree of bone destruction surrounding pulpless teeth have no bearing on their possibility as foci of infection.

4. A clean tonsillectomy, with removal of the plica tonsillaris, and alveolotomy for the removal of most infected pulpless teeth, is necessary in every case.

5. Data concerning cases of arthritis in which infected teeth have been removed by the simple extraction method, cannot be considered authentic.

Bibliography

1. Barker, L. F. Classification of Arthritis, *Monographic Medicine*, New York, Appleton, 1916, IV, 96-117.

2. Lillie, H. I. and Lyons, H. R. Tonsillectomy in Myositis and Arthritis. Results in two hundred consecutive cases, *Jour. Amer. Med. Assn.*, (1919) LXXII, 1214-1216.

MOUTH HYGIENE AS TAUGHT AND PRACTICED IN THE PEORIA PUBLIC SCHOOLS

By H. C. CARROLL SMITH, D.D.S., Peoria, Illinois

(Read before the Chicago Dental Society, January 19-21, 1922)

PROGRESS is the law of the universe. The individual who refuses to come under obedience to this law is not only handicapping himself, but all those whom he serves are deprived of their rightful part in that which is highest and best—that good which the age holds for man's development, comfort, usefulness and happiness. Look up and look out says the law of progress. Come away from the insufficiencies of the past. Be not content to remain in the valley of limited accomplishment. A walk up the mountain of attainment will give you a vision of possibility for larger service; a broader outlook on the great problem of endeavor. The valley is no place for the man who is properly linked to his life work. Ambition never finds place to expand on the lowlands. But a climb up the steeps of unselfish activity brings the faithful worker and thinker in touch with a view of achievements not yet attempted.

"The heights by great men reached and kept,
Were not attained by sudden flight,
But they, while their companions slept,
Were toiling upward in the night."

So wrote the poet when inspired with a view of life's activities.

Stagnation means insufficiency, decrepitude, death and decay. It is a lack of man's fullest and best to meet the demands of the hour. Man cannot climb and attain and serve while he sleeps. It is the wide-awake, alive, alert, and active intelligence that helps in the worthiest and latest and best of the world's benefits to mankind. Ever in all ages have been the men of noble vision; men who saw ahead of their time, men who were laughed to scorn; men who were discredited and belittled, only in later years to be acknowledged for the truth which they taught and to be loved for the good for which they stood.

Every time has had its ignorance which has said of the step in the line of progress, "it never has been done and it never can be done." Every breaking of the light on new endeavor has had to go through three stages. First, people say, it conflicts with reason; next, they say, it has been discovered before; lastly, they say, we have always believed it. This thought came to us from Agassez, the celebrated naturalist and author. It plainly delineates the alikeness of human nature in all ages.

Inception, Struggle and Progress

Some years ago a few men of alert intellect and unselfish energy awoke to a vision of a more worthy and beneficial dentistry. They toiled on while their companions slept. When they began to make known the results of their research

they were sneered at and scorned by their less-progressive brethren. But the truth about anything is always catching. Men with receptive thought began to be doers, and there sprang into being a department of dentistry that is with us to live and to bless mankind through all time, a dentistry of prevention and elimination doing away with the extensive repair now so in evidence in the mouths of humans and reducing fear through a simpler, kinder and more pleasant mode of service.

As the message of this clean mouth movement began to be sent around the world, here and there it found a receiving station controlled by a dentist who realized that the time for thinkers had come. This type of dentist has attached a wireless to his endeavors and is receptive to every current of modern benefit that is bearing abroad the message of better dentistry to serve the age. Peoria was not left out in its intellectual and comprehensive tendencies, and because its dental profession had mental endowments attuned to the spirit of the times, receptive to any message destined to bring good news to all people, we are today reaping the benefit of this invaluable step in modern dentistry. It does not matter who were the first to catch the vision. They do not care for an illumination on their names; but that they were equal to the call of opportunity is not only proved by their success in practice and their standing in the profession, but is also evidenced by the present state of mouth hygiene as it is taught and practiced in the Peoria public schools. Today the workers in the dental department in our city schools are picking apples off the trees planted by fearless, untiring, unselfish, wide-awake and capable men who have fostered the movement through evil and good report; through difficulties and embarrassments, working without money and without price, for better or for worse, devotedly determined never to relinquish their efforts until the justice of their cause be established.

They found a kindred ambitious spirit in the school nurse who, working hand in hand with them, perfected system and procedure which thoroughly organized a dental department of which Peoria may well be proud. The superintendent of schools and the school board responded to the irresistible efforts of these indomitable spirits of progress and today are enthusiastic in their appreciation and support of this department.

From the time this work was started at the "Neighborhood House" over ten years ago until today, where we have arrived at a working basis, has been a long journey. Many obstacles have been overcome. The history would take a good-sized volume to contain it. Like a problem in higher mathematics that takes pages of practice paper upon which to figure and experiment, so that the final results may appear neatly on a clean white sheet without an error, so today we erase the experimental figures of the past, and come to you with the solution of the problem in its present state of activity.

Motive

Before coming to a consideration of the clean mouth movement as it is taught and practiced in our schools in Peoria we would not forget to give full appreciation to every dentist who has helped in the development of this work. Service so freely given never must be forgotten. The good that has been accomplished cannot be measured in words. All we can do with these pages of endeavor used to figure out the problem is to write over them the name of the principle by which the problem was solved, namely, "Others",

> "In all the work there was to do
> One motive shone sincere and true;
> That all the good they'd learned to do
> Must needs be done for 'Others'."

Organization

Today through the efforts of the oral hygiene staff of the Peoria County Dental Society the Board of Peoria School Inspectors has permitted to be installed two dental infirmaries modernly equipped with everything essential to advance the cause of "The Clean Mouth" among the twelve thousand children in our schools. A dentist is employed for full time service and is provided with an efficient assistant. Monday and Tuesday of each week the dentist and his assistant are at the Douglas School Infirmary where they care for the mouths of the children from the ten schools tributary to the infirmary. Thursday and Friday of each week the same service is rendered at the Irving School Infirmary to the ten schools in the bluff district of our city.

The Lectures

Wednesday of each week is lecture day. On this day the dentist goes from school to school talking to each room separately. It requires the Wednesdays of an entire school year to lecture in each room once. The lectures occupy from twenty to forty minutes according to grade. There is a separate lecture for each grade beginning with the kindergarten and progressing according to age through the eight grades. These lectures are adapted in language and manner to meet the mental capacity of each grade, all technical terms are done away with and the simplest possible presentation is used.

The seventh and eighth grades are given a stereopticon lecture with slides that allow an appeal to the pupil's self respect and future good. Below the seventh grade the story method is used with object, models and blackboard work. There is no trouble to interest the children of all ages if one is alert to his opportunity to study child nature and cater to the mental capacity of the pupils. The kindergarten kiddies are just as easy to talk to and just as receptive as the eighth graders and the respectful and undivided interest in all grades attests the good that is coming to the boys and girls during their years of educational development. Every lecture is concluded with a thorough drill in toothbrush technic. The child is instructed as to the right kind of toothbrush and the proper use of the right kind.

In these grade lectures the subject is "Cleanliness". We dare not be at all technical, yet we teach by story, object and illustration the result of lack of care of the teeth, why teeth decay, and the necessity as well as the way to do away with mouth troubles.

In addition to these grade lectures each high school is visited once a year with a lecture for more advanced thought. Last year they had an additional visit with a short lecture and were given an opportunity of seeing the moving picture film gotten out by the New York oral hygiene committee. These lectures present the matter of the selection of a dentist, hints regarding what constitutes good dentistry, what the patient may expect of the dentist, and what the dentist may expect of the patient. A strong plea is made for the care of the mouth with the reasons why, concluding with the same toothbrush technic.

The dentist also gives a series of lectures each winter to the special school conducted for departmental store girls who were unable to complete their education. Here quite a different course is pursued, the subject being handled in a way to connect with business ethics and to give some information regarding what may be expected as results from the abscessed tooth and gum troubles resulting from neglect and uncleanliness. The girls are required to report on the lectures in writing as a part of their English credit.

The normal training teachers' class also comes in for lecture work and is instructed by models and has the subject of orthodontia presented to them with hints of how they can be useful to the parents of the child.

One of the most helpful parts of the lecture program and by far the most taxing on the dentist, is the twenty lectures given to mothers' clubs. Each mothers' club is so decidedly in a class by itself that no set lecture could be given to meet the need in all the communities. So one must be alert to meet any emergency of the hour. Pitiable and laughable, as well as gratifying, are the experiences at these meetings. The mothers are eager for information. They listen with rapt attention and seem more oblivious to bumped noses and squalling babies and other unmentionable hindrances than does the speaker. But woe to the speaker if he allows himself to be cognizant of anything whatsoever except the solicitude of the mother to do anything to save her child's teeth and do the right thing for the objects of his love and care. It is usually a very plain talk the mothers want and they seem grateful for information they have never obtained from any other source.

The lectures before the parent-teachers' associations call for a different type of talk. There is considerable prejudice to be broken down and the parent and teacher are given a right understanding for the existence of this department in education. It is an opportunity to break down opposition and enlighten ignorance regarding the real object of the cause of mouth hygiene in public school work. Parents and teachers must be given to understand that instead of interfering with the child's rights, as some have suggested, we are establishing the child's rights to a healthy body, a normal constitution, a good set of teeth, and a clean and alert mentality. The parent must understand that every child has a right to cleanliness, happiness, comfort, health, beauty and usefulness. They should know why children's teeth decay and the remedy. They should know the importance of caring for children's teeth and the results of the lack of this care. A strong plea is made for parent-teacher co-operation in the clean mouth movement. The benefits of preventive dentistry are explained and urged. But our disappointment comes when, after convincing the parent, they come to us with a tale of woe about their own dentist who either refuses to do anything for their child or else tells them the first teeth are not worth bothering with. He will neither extract, fill nor treat them and sometimes not even relieve the pain. The school dentist is at times at his wits' end to know how to answer the concerned mother when she comes to him with what her dentist has said in trying to rid himself of the care of the child. The school dentist tries to be charitable to all and to encourage every one to remain loyal to their own dentist, speaking a good word for all. But what can he say when they come to him with discouraging talk that prevents the child from receiving any dental service whatever. It seems only just that if a dentist does not want to work for children he should say so and allow the mother to find some one who will, rather than tell them not to mind what the school dentist is trying to put over, that children's teeth are not worth attention and that this preventive dentistry is all a humbug. It is marvellous what some dentists will do and say to get out of working for the child.

The Child as a Patient

The child! The child is not a nuisance. The child makes the best kind of a patient when it is properly handled.

Children are no more impossible than adults. They show more common sense, comparatively, than their elders, and are more susceptible to reason and kindness. It will pay the dentist to understand the child.

Toothbrush Technic

Before taking up the practical work done in the infirmaries let us consider the instruction that is being given regarding the selection of a toothbrush and the toothbrush technic. The school dentist carries with him at all lectures several makes of the right kind of toothbrush. He describes the right kind of brush, making drawings on the blackboard. The brush that is being recommended is the brush that goes down hill, the longest bristles being nearest the handle, the shortest at the end, the bristles slanting between. Some makes of these brushes are the Rolling, the University, the Klenso, the Rotary, the Exeloid. There are others, but the shape of the brush is insisted upon as essential to a proper demonstration of a perfect technic. Try the technic with other shapes of brush and it will not be a success, and we are quite sure that the technic taught is the simplest ideal way to brush the teeth and gums.

The child, and the adult as well, when purchasing a toothbrush is urged not to try out the quality of the bristles by running the thumb over the bristles for reasons of cleanliness and sanitation. He is instructed to soak a new brush in strong salt water for twenty-four hours then shake the water out and put in the sun to dry. The family toothbrush is exposed, ridiculed and its evils explained in a way to leave a lasting impression.

Mouth washes are discouraged and are only to be used under a competent dentist's advice. Dentifrices are encouraged for the same reason that soap is necessary for the bath. If a tooth paste is used the brush is not to be wet but a ribbon of paste is spread on the dry bristles and the brush placed in the mouth with bristles up. It is then turned with back to the cheek, the cheek pushed away, and the sides of the bristles placed on the gums above the upper back teeth. With a rolling motion the teeth are brushed on this side counting ten strokes toward the biting edge of the teeth, keeping the gums massaged between the teeth where they belong. The brush is next placed on the gums above the upper front teeth from central incisor to cuspid and the same rolling motion employed ten counts. These two positions are repeated on the other side of the upper jaw making four positions. The same process is applied to the lower teeth, first pushing the cheek away with the back of the brush, placing the sides of the bristles on the gum below the lower teeth and rolling up on the gums and teeth toward the biting edge ten counts to each of four positions, being careful to always roll the bristles away from the gums, seeing that the spaces between the teeth are thoroughly cleansed. The lingual surfaces of the back teeth are next cared for, placing the sides of the bristles on the gums near the teeth and with the same sweeping motion roll down on the upper teeth and up on the lower teeth. Inside the upper front teeth the brush is inserted perpendicularly with the bristles next to the gums and teeth and the motion is down and out. Inside the lower front teeth the brush is inserted at a vertical slant and the motion is up and out. The grinding surfaces of the teeth are brushed back and forth as in scrubbing. Brushing both up and down is discouraged, also brushing in circles, as well as the scrubbing motion on buccal and lingual surfaces. The use of dental floss is also taught in a way not to irritate the gums, and the use of the wood toothpick is dis-

couraged. In demonstrating this technic the lecturer uses his own toothbrush in his own mouth and to prove the virtue of the method his own gums have become firm and healthy. Neither his gums nor his teeth are any the worse for the wear although he brushes his teeth from twelve to eighteen times every Wednesday. There is no soreness or irritation. After the brushing the mouth is thoroughly rinsed with water, the toothbrush is rinsed and sprinkled with a little salt and put in the sunshine to dry.

How Patients Are Secured

Now as to the practical work done in the infirmaries. First, it may be of interest to know how the dentist secures his patients. This is the work of his assistant who secures them through the school nurses. The nurses make all examinations in the schools. All that is necessary for them to know is that the mouth needs dental attention. A note is sent home with the child urging the parents to see that the work is taken care of by their own dentist. Where the parent is not able to afford the price of dental service, a card is enclosed for the parent or guardian to fill in and sign, with the request for service to be rendered in the infirmaries. No patient is worked for without this written consent of the parent or guardian. Only such patients are cared for where the home conditions and finances warrant it. A child is never coerced. If the child or parent objects the work is discontinued. However, the parent is not allowed to dictate. They must either accept the judgment of the operator or employ their own dentist and once they refuse they are not given another privilege when the work becomes more difficult. Any patron of the schools may avail themselves of the school dentist's services if their income according to the size of their family demands it. For those who can afford, the responsibility rests with the local dentists in practice.

The dentist's assistant arranges all appointments. She keeps all records and knows what is being done for each child, and is very helpful in keeping treatments and operations in mind so as to give a hint to the dentist as the next patient is called. She often reminds the dentist if the child is easy or hard to work for and recalls any special characteristics of temperament that need to be borne in mind.

Practical Work in Infirmaries

Every moment is a busy moment and there is no time to sit down ever, from the early hour till the day is done. There are more patients than can possibly be cared for by one dentist. We do the best we can, trying to serve all. Once work is begun in a patient's mouth we aim to finish all there is to do in the mouth before dropping it. You would be surprised at the amount and character of work cared for in some mouths. In some cases every tooth in the mouth has had attention and shows the results in treatment and filling, that would cost the child from $75 to $100 at a moderate charge.

The aim of the department is to do preventive dentistry. If our efforts could be confined to the mouths of the children of the kindergarten and first three grades, in seven years we would have a set of boys and girls ready to enter high school with clean mouths and teeth in good repair.

At first we served the entire eight grades but we found so much repair work in the seventh and eighth grades that it was taking all of our time. Now we are serving six grades and the best we can do is to divide our time between the preventive and reparative, hoping in time to work into the preventive feature alone.

Since our state laws do not permit the lady oral hygienist the busy dentist has to

be content with giving each patient a cleaning. The temporary teeth that do not involve the pulp are cleaned and filled with Ames black copper cement. Even those that have not decayed are given the preventive treatment when the fissures are defective and the sulci imperfectly formed. In the front teeth a light cement is used when we do not consider it best to use the nitrate of silver treatment, neutralizing with bicarbonate of soda under electric light pressure.

And what do we do with the gum boils, so-called? We get rid of them by getting rid of the tooth. We extract. We do take care of some cases treating the abscess and filling the root-canals because certain of our dentists cried down the evils of the foci of infection and mothers demanded the saving of the baby teeth dead or alive. Owing to the difference of opinion in this matter, until the department and its teaching is more fully established we shall have to cater to those who believe in the evil of allowing the devitalized tooth to remain in the child's mouth. It would seem that the benefits to the child should be given a more careful study. Whether it is better to allow the child to suffer the effects of the foci of infection and keep the devitalized tooth treated upon the theory that they are needed for the continuity of the arch and the well-being of the second teeth, or, out with the cess pools of infection for the sake of the health of the child, for the sake of a clear brain for thought, a steady nerve for action, a sound stomach for digestion, and a happy disposition for mental discipline and proper application for developmental influences?

You say the gumboil, the abscess, the cesspool should be cured—once a garbage can, always a garbage can. You have a right to dispute this theory to be sure but can you make a rotten apple good? Is it not reasonable to assume that the only way to cure such a condition is to eliminate it, put it out, and let a pure condition reign in its place? The point is to do the greatest good to the child. Any condition that comes as the result of premature extraction of deciduous teeth can be remedied at the hands of the specialist easier than dozens of things that come as the result of the foci of infection caused by abscessed deciduous teeth.

A word for Ames black copper cement. It is one of the greatest blessings that has been given to modern dentistry. Why cause the child to submit to severe operations and permanent fillings with this splendid friend of prevention at hand. It is true there is a predjudice to its color but we have by careful explanation broken down this predjudice and its greatest objectors become its appreciative friends. It is such a simple technic that is required to succeed in its use. Yet that simplicity is an adaptibility borne of experience and can be acquired by the child-loving, problem-solving operator.

We must not neglect to say that guttapercha fillings are also used when conditions indicate. Another thing that we have found helpful in the school clinic is carbol eugenol. We do not claim to be expert in its use but we are learning and we are very sure it has its place when properly applied. Used in connection with Ames copper the seeming impossible is often accomplished, the pulp saved alive, devitalization either prevented or retarded, and the usefulness of the tooth prolonged.

The Sixth Year Molar

Practically all sixth year molars that come to our attention are taken care of with preventive measures, using the Ames black copper cement unless they have reached us too late and must have

reparative measures. In such cases we fill with amalgam, first lining the cavity. If the pulp is involved what shall we do? We will keep it alive if possible, even for a short time, watching its progress. Here carbol eugenol serves us when nothing else will. When it must be devitalized or extracted we refer the case to private practice as no permanent teeth are treated in the school clinic and we take care of no major extractions.

All abscessed permanent teeth are referred for gas extraction and a personal message written to the parent.

Various forms of infected gums are encountered and the simpler cases are treated and the patient urged to cling to the toothbrush habit using his own and not the family toothbrush since the majority of such cases can be traced to the family toothbrush. The extreme cases of infected gums are referred to private practice.

The Child's Right and the Dentist's Responsibility

The field of the clean mouth movement in public school work, opens up paths of usefulness, activity and inspiration hitherto undreamed of. The movement is allied with the world's very best humanitarian enterprises. We might recite for you the many interesting experiences, pathetic, humorous and gratifying and tell of the results obtained in the work but there is no time for that in this paper. We simply want to say we enjoy the work with the children for it seems so well worth while. The vision that has come to us of the good to be accomplished has made us enthusiastic to do our best for the child and to this end we want to pleasantly and effectively cooperate with the dental profession and with the educational forces extant for the child's comfort and development. A clean mouth is the right of the child. It has much to do with his well being, with his efficiency in school, with his physical development and with his future success in life.

Just within the threshold of the two lips of a child's beauty, nature has placed two rows of pearls; pearls of inestimable value; pearls whose equivalent cannot be purchased at any price. They are jewels beyond compare. The child must be taught and helped to value them beyond riches for once lost the world's billions cannot replace them. They must be taught and helped to love them, care for them, keep them clean. They are the child's birthstones of good health and, well guarded, have much to do with success and happiness through life. The child must be taught and helped to treasure them with prophylactic consideration, to make them lustrous, keep them clean.

Fellow dentists, are you helping in this great work for the good of humanity? Are you linked with this clean mouth movement? Are you supporting with your influence and good will and encouraging work the doctrine of the clean mouth and sound teeth for the child as well as for the adult? If not, are you willing to lend a good word and bid God-speed to those who are? The child must be served for the children of today are the men and women of tomorrow, and the dentist who serves the child is helping to produce a better quality of citizenship, a healthier, cleaner, and more perfect race, and is making the dentistry of the future more pleasant, easier and more profitable to both dentist and patient.

THE LOS ANGELES MEETING

By BERT BOYD, D.D.S., Los Angeles, California

THE 64th annual meeting of the American Dental Association became a matter of history on the afternoon of Friday, July 21, 1922, at the Ambassador Hotel, Los Angeles, California.

Of intense interest to all sections of the United States, this meeting marked an epoch in the existence of the profession of dentistry on the Pacific coast; particularly in California and more particularly in southern California, because of its being also the celebration of the twenty-fifth anniversary of the latter organization.

What was the great motive which prompted the members of the Southern California Dental Association and the other coast dental societies to strive for the honor of acting as host to such a wonderful body of men and women as are found in the American Dental Association?

Only to see this portion of our country, of which we may justly be proud? Most emphatically *no*. The presence of the leaders of any great organization, in a given place, for a week, with the bulk of the time given to the dissemination and acquisition of knowledge appertaining directly to the life and progress of that organization is a stimulus to be coveted.

This, then, was the impelling incentive in the hearts of the members of these several associations and made them more than willing to labor hard and long to obtain and provide for such an inspirational gathering.

Was a lethargic state of the dental profession on the Pacific slope a reason for wishing a national meeting in our midst?

On the contrary, the personnel of the profession in this district is composed of those in whom there lives a constant and sincere desire to keep a little more than abreast of the times and to accumulate and dispense ideas which are really helpful in the progress of dentistry. A perusal of the recent program will, we are certain, verify this statement.

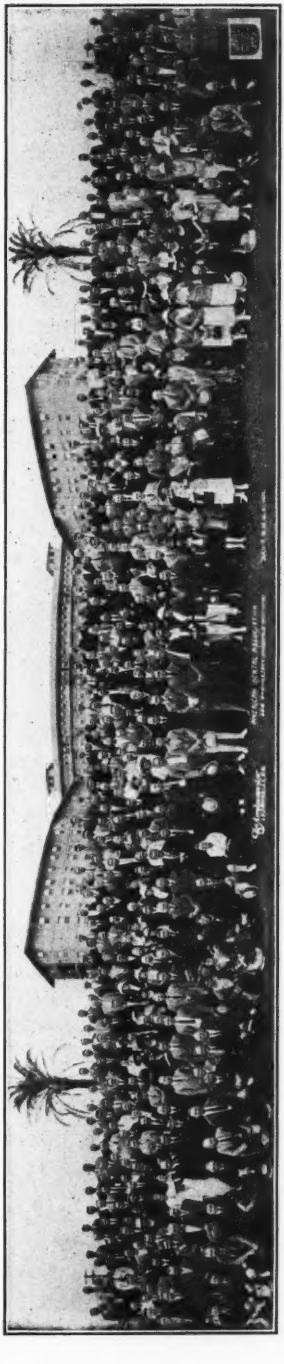
To successfully stage a national meeting two thousand or more miles from the centers of dental activity is no small undertaking, but it takes a greater obstacle than this to "wet blanket" the spirit of a genuine Californian.

That the California spirit of "co-operation" and "boost" is not confined to real-estators alone, but permeates all lines of activity, dentistry included, was evidenced before and during the convention.

A book could be written regarding the months of laborious effort put forth by those of the local committees, but to what purpose. The knowledge that the 1922 convention was a decided success in every particular is sufficient and amply repays all who were responsible.

What reasons are had for feeling that the convention was a success? It was held in a wonderfully progressive city, in a spacious and beautiful hotel and grounds, ideally situated, and the registered attendance was nearly five thousand.

The program was a splendid one and well presented. The intense and sus-



The Sixty-fourth Annual Meeting ot the American Dental Association, the Ambassador Hotel, Los Angeles, California, July 17-21, 1922

tained interest, particularly in the work of the several sections, was really remarkable and probably exceeded at no other national convention. The rooms in which these sessions were held were crowded continually.

The group clinics deserve special mention as they spoke volumes for the months and months of effort put forth in their preparation.

The opening general session on Tuesday morning, July 18, in the theater in the hotel, with every seat taken and hundreds standing in the foyer, gave assurance of a successful meeting. The addresses of welcome; the responses and the president's address, were impressive and ably given.

One of the pleasant features and a happy surprise, was the presentation to President Hartzell of an orange wood gavel, suitably mounted and engraved in gold and silver and given by the Local Arrangements Committee and the Southern California Dental Association.

The second general session on Tuesday evening, at the Trinity Auditorium, down town, was a health meeting and open to the public. The attendance was most gratifying, the audience most attentive and appreciative and the addresses by Dr. Thos. B. Hartzell, Miss Evelyn Schmidt and Dr. Guy S. Millberry were above par.

One of the outstanding features of the convention was the Public Health Exhibit under a great tent, erected over the double tennis court. Nothing quite like this has ever been presented and proved of inestimable value educationally, both to the layman and dentist. Undoubtedly much more prominence will be given to these demonstrations at future conventions.

We were told months before the convention, that the manufacturers' exhibit would be about the finest ever. If there is any doubt that it was, ask any exhibitor who occupied space on the floor of that beautiful dining room and get his answer. Ask him concerning the volume of business he transacted and see him

smile. We have not a word to retract from the statement made at the beginning of this paragraph.

If we are to judge by the expressions coming from those who visited the convention, and were recipients of the hospitality and entertainment offered by the committee and the dentists of southern California, the convention was a decided success from the entertainment standpoint.

Was the convention a financial success? Read the report which is to be sent to the trustees of the American Dental Association soon and be your own judge. There will be no deficit you may be assured. But above all, the most convincing reason we have for believing in the success of the meeting is the feeling among the dentists of our own jurisdiction.

It has resulted in the addition of over two hundred new members in the past year and aroused an enthusiasm which will be felt for years to come.

Everywhere, members of the profession are striving to become more proficient servants of the public, and we know that a large percentage of our own will benefit immeasurably from the visit of the national body to Los Angeles in 1922 and be given a stronger desire to "perform dentistry that will add ten years to human life."

"Prevent," "preserve" and "progress" have a newer and larger meaning and in the degree in which we are able to accomplish these admonitions, will the measure of our future success be.

All Hail and God Speed to the American Dental Association.

Southern California is more than pleased to have had the American Dental Association as a guest and trusts that this great honor may again be ours at some future time.

The Local Arrangements Committee esteems it a great honor to have been connected with such a large undertaking as making provision for an annual meeting and is grateful for the privilege of at least having tried, with the assistance of the profession of the Pacific Coast, to make the 1922 convention, a successful one.

NATIONAL DENTAL MEETING

By E. S. SMITH, D.D.S., Des Moines, Iowa

THE meeting of the National Dental Association at Los Angeles July 17 to 21, was the first time that a meeting of the National has been held west of the Rocky Mountains. Elaborate preparations for the entertainment of the visiting guests had been made by the dentists of the Southland and everything was done to make the stay of the visitors one long to be remembered.

The climate was all that had been claimed for it by the California men who had extended the invitation in behalf of Los Angeles, first at the Boston meeting and again at the Milwaukee meeting. With no rain or excessive heat, the weather was ideal.

A special train of sixteen cars over the Santa Fe and another special of fourteen cars over the Union Pacific brought some of the visitors and an automobile caravan from San Francisco brought others. Many ladies were present at the meeting—undoubtedly attracted by the scenic travel routes and by the entertainment promised by the local committee. Between four and five thousand members registered and while this was not as large an attendance as during the past few years, yet this was a remarkable attendance when the business depression of the past year, the present unrest in railway circles making inconvenient railroad experiences a possibility, and the long distance necessary for many, are all taken into consideration.

The meeting was held in the large palatial Ambassador Hotel located about a fifteen minute ride out from the business section of Los Angeles. A large theater, convenient adjacent assembly rooms, a beautiful lawn, large spacious porches, shops, restaurant, dining rooms, every necessary convenience accessible without the necessity of leaving the building, made the Ambassador a wonderful home for a meeting of this kind.

The theater of the Ambassador was the place of gathering for the first general session on Tuesday forenoon. Doors on either side let in a cool refreshing breeze, and one sank into the cushiony opera chairs feeling that he could listen to the speeches in comfort. A large basket of flowers stood on a table beside the president's desk. Signs—"Dentistry Can Add Ten Years to Life" and "Dallas 1924" greeted one. Light coming through square holes in the arch above the stage made the lighting effect for the stage similar to rays of sunlight. Such was the setting for the first general session.

The crowd was slow in gathering and the organ recital did not begin until after ten o'clock. As is probably true of opening sessions of all kinds there was an undercurrent of excitement and expectation, as the program was about to begin. In the procession which marched from the rear of the room and took their places on the platform were President Hartzell, President-elect Buckley, Secretary King, several members of the Board of Trustees, the speakers, and guests of honor from Mexico, Japan, Australia, and Sweden.

Dr. Rufus von Kleinsmid, president of the University of Southern California, in the opening address of welcome stated, "A profession augurs a science, a science augurs teachers, and I have the unique

privilege to welcome you on behalf of the teachers of California." He felt sure that we would come because in Los Angeles they classify people into three classes, first, those who live in Los Angeles; second, those who hope to live in Los Angeles; third, those who are on their way to Los Angeles. He made a plea for true scientific truth and hoped that the meeting would impress upon their people the necessity of a thorough scientific training for the practice of dentistry.

Los Angeles has a wide-awake Chamber of Commerce and their representative, S. L. Weaver, proved to be a live wire. Combining humor and fact he gave a most interesting address. He warned the audience to beware of the bombastic boasts of their hosts as there seemed to be something in the California climate that tended to inflate many a person's imagination. "However," he added, "you must believe what they say." He gave some interesting data about the city—that the name was Spanish and meant "Lady of the Angels" and that it had been founded with pomp and ceremony in 1781 when that western country was still under the control of Spain.

Dr. Charles M. Benbrook gave the address of welcome on behalf of the dental profession of California. He gave a brief history of the California societies and stated that the Southern California society was celebrating its twenty-fifth anniversary by having the National with them. On behalf of the local committee he presented President Hartzell a gavel made of orange wood, and having on it, a band of gold and a ferrule of silver.

Dr. Thomas P. Hinman, of Atlanta, in his typical southern style, gave a fitting response to the addresses of welcome. He thought that the magnificent work of the local committee with the president in a far distant city should have the approval of the whole association. In closing he voiced the sentiment of all when he said: "We will always have a pleasant delightful memory of what the people of California have done for us."

The second general session was on Tuesday evening. It was in charge of the officers of the section in Histology, Physiology, Pathology, Bacteriology, and Chemistry (Research) and was in the nature of a symposium. Some of the perplexing problems that are before the dentists today—what teeth should and what teeth should not be root-filled, diet, rules in making a dental diagnosis—were ably presented by such authorities as Seccombe, Bunting, Rickert, Grieves, Friesell, Hinman, and Price.

The keynote of the convention was "Prevention" and about the slogan originated by Dr. Hartzell "Dentistry can add ten years to life" a great deal of the program was built. The section on operative dentistry arranged to devote half of the time allotted to their sectional meetings to the consideration of oral conditions during childhood. It was felt that in the past "dentists have failed to properly care for the mouths of their little patients and have missed the real place to practice preventive dentistry."

The Public Health Exhibit housed in a large tentorium on the lawn of the Ambassador was another means used to stress this same point. Displays of *pictures* and charts illustrating methods of teaching oral hygiene in industrial, state, school, and public clinics were presented. The problems of child nutrition not only as regards the child but also the nutrition of the mother during the prenatal period were emphasized by the exhibits. The display was open to the public. It was the first time that a display of this kind has been attempted for a meeting and it is to be hoped that the same feature will be presented at future meetings.

Another feature of public interest was the third general session held at Trinity Auditorium, in the downtown business district, on Wednesday evening. President Hartzell used as his theme the slogan of the meeting. He spoke in a prac-

tical way on the possibility and responsibility of the dental profession as suggested by the slogan. At an earlier meeting Dr. Hartzell had stated: "It is my hope that the dentists at this convention will put all commercial thoughts aside and will devote much of their time to the work of the prevention of caries in the teeth of children and less to the expensive and difficult work of patching up the teeth of adults. If this is done there will be no need for adults to have anywhere near the amount of trouble in the future that they have at present with their teeth. There is no greater work today than the work of preventive dentistry. We have failed to care properly for the mouths of our little patients. It is the sincere hope of the officers that the meeting will stimulate the dentists throughout the country to better dental treatment of children." Other speakers at the Wednesday evening meeting were Evelyn Schmidt of Boston, Mass., mouth hygiene instructor of the Masaschusetts Department of Public Health who spoke on the subject "Dental Health Work in Massachusetts," and Dr. Guy S. Millberry of San Francisco on the subject, "Fundamental Problems of Preventive Dentistry."

The House of Delegates was a representative body; there were many familiar faces as well as many new ones. The House convened on Monday forenoon for the first business session and again on the afternoons of Monday, Wednesday and Thursday.

One of the first pieces of business taken up was the change of name and charter. The National Dental Association had grown to such large proportions in the way of membership, and its activities had come to necessitate such a vast amount of business and the handling of such large sums of money, that it had come to be working entirely outside the scope of its charter. Dr. C. W. Hall of Milwaukee was called upon and explained that it had been deemed advisable to prepare a new charter under the name of the "American Dental Association of Illinois." The plan for the adoption of the new charter was that the new association should take over everything pertaining to the National association—accept its resources and assume its liabilities; take over the membership and have the same officers. The new charter contains everything of the former charter and in addition it provides for the increased business of the society and anticipates some of the activities of the future. But slight changes were made in the by-laws.

In the discussion which followed, the question was raised, "Why had the charter been obtained in Illinois rather than in some other state." The question was answered by the following good reasons: (1) The laws of Illinois permit the holding of annual meetings in any state. The laws of some states would require that the annual meeting be held within that state; (2) trustees may hold meetings outside the boundaries of the state; (3) many legal problems relative to fraternal organizations and the American Medical Association have already been settled by the courts of Illinois; (4) many of the society's activities are carried on in Illinois.

The resolution of Dr. G. A. Crise of Kansas that the transfer be made from the National Dental Association to the American Dental Association was adopted unanimously and immediately after the vote was taken, President Hartzell pronounced the meeting of the National Dental Association as adjourned sine die, and then announced the opening of the first session of the American Dental Association.

The transfer was not without its dramatic side. Sixty-four years ago, at a time when the profession was in its infancy, an organization known as the American Dental Association was started and it functioned until the time of the Civil War when the southern dentists broke away from the northern and organized the Southern Dental Association. In 1896 the Northern and the Southern

associations were merged into one but under the name "National Dental Association." In a stirring patriotic speech S. W. Foster a southern delegate from Georgia speaking on the resolution for the change of name, stated that the action was "the climax of the evolution of dentistry." Twenty-six years ago when the northern and southern associations had been merged there had been in the south many a shake of the head and there were many dissenting votes, but today there had been a great unanimity of action and not a single dissenting vote had been cast by the southern men. "In the great World War the boys of the south fought and died side by side with the boys of the north. It was their mixed blood, strewn on the battlefields of France that won the war. There is no such thing as sectional rivalry now and we of the south are heartily in favor of taking our old name which stands for the highest professional standards and the betterment of civilization through means at our command."

Pronounced and prolonged applause followed and Dr. C. N. Johnson, speaking as it were for the north, stated that we were glad to be the associates of our southern brothers and that the north and south stood today more united than ever before.

What the association would do without the work of its efficient secretary, Dr. Otto U. King, is hard to imagine. He seemingly has everything pertaining to the activities of the society at his finger tips and every presiding officer can feel entirely at home with Dr. King at his side to act as an aid. Dr. King reported that from January to June, 1922, dues had been received for 27,126 members, the largest in the history of the association and he estimated that by the end of the year the total would be approximately 33,500. The *Journal* has been especially prosperous the past year the income being $87,826 and the expense approximately $76,000 making a net earning of over $10,000. The advertising rates have been increased and he estimated that during the coming year the advertising alone would bring in a net income of more than $8000. It was interesting to learn that as regards the advertising in the *Journal* a strict censorship is exercised and only those advertisements which can pass this censorship are accepted. Some of the points of censorship are: No advertisements of tobacco; they must not reflect on the product of a competitor; the association must not be used as a reference; they must not be misleading. Thus only high-class advertising gets into the *Journal* and it is ready at all times to stand behind its advertising.

Dr. King recommended that inasmuch as the society was in a good financial condition, that the action on the motion laid upon the table at the Milwaukee meeting to raise the annual dues to $3.00 be deferred. He also recommended that the *Journal* be issued semi-monthly and that the subscription price to non-members be raised to $4.00; that a quarterly bulletin for the interchange of ideas and opinions between the officers of the various state societies be issued; and that the book-keeping systems for the state societies be standardized.

At the present time there is no standard law in the various states regarding dental hygienists, and during the past year the Board of Trustees appointed a committee to draft a form of a law that could be used as a model. The report of the committee as adopted embodied the following points: (1) Applicant must be at least 19 years of age and must have had at least one year in high school; (2) applicant must have taken a 32-week course in some school, this course to give a broad general knowledge of anatomy, bacteriology, preventive dentistry and pathology; (3) examining boards shall determine what schools should be recognized; (4) for a successful examination given by an examining board, a certificate shall be granted allowing the applicant to perform the work of prophylaxis but no other operation in the mouth.

The report of the Research Commission of the work being done in dental research was very encouraging. As you know, research work is now being carried on by means of grants to individuals and schools. One dollar of the dues of each member in Iowa goes towards the carrying on of this work. Research work is a type of work that cannot be done in a certain specified time; sometimes marked progress can be made in a comparatively short time and again it requires a hard tedious pull. When it is required that a report be made by a certain date the work is apt to be hurried and to be incomplete and the conclusions to be hasty and inaccurate. The Commission is following a wise course when it leaves it to the director and the worker having a problem in charge when to report. Dr. Hetrick made an apt statement when he said, "Truth should be the goal of our ambition."

While the work is not being confined as regards locality or individuality yet the commission is exercising a great deal of care in the selection of workers and the giving of grants. It may be of interest to know that some of the problems being worked upon are:—the serum test for tuberculosis, the effect of a restricted diet upon caries and upon pyorrhea, the permeability of cementum, the relation of saliva to systemic and pathologic conditions, the sterilization of pulp canals.

The second mortgage upon the dental institute buildings at Cleveland has been paid and the first mortgage has been reduced from $27,000 to $21,500. A 99-year lease for the property has been negotiated. The amount of rental is on a sliding scale and the cash receipts for the 99 years will be more than one million dollars. To recognize the great work that has been done by Dr. Weston A. Price, a resolution was passed to the effect that after all obligations against the property have been paid the fund accruing shall be known as the Weston A. Price Fund.

The legislative committee has been alert to its duties during the past year and it merits the commendation of every member of the profession. As will be recalled, at the time of the Milwaukee meeting last year, the tariff bill with a favorable paragraph relating to duties on dental instruments had been passed by the House of Representatives but had not been passed by the Senate. Soon after the Milwaukee meeting Dr. Homer C. Brown as official representative of the society was called before the Senate committee. A protest was made by him that dental instruments and surgical should not be included in the same paragraph in the bill. While many surgical instruments are imported into this country yet as regards dental instruments the ratio of exports to imports is 20 to 1—proof conclusive that the manufacture of dental instruments in this country needs no protective tariff. The legislative committee felt that a favorable impression had been made upon the Senate committee and it was much to their consternation to find, when the bill was reported out by the Senate committee that not only had there been but slight reductions in the specific duties but that the ad valorem duty had been increased from 35 per cent to 60 per cent. The dental committee immediately got busy and, to make a long story short, the Senate committee reconsidered their action, and when the bill was again reported out the specific duty on dental instruments had been entirely removed and the ad valorem duty had been reduced to 35 per cent the exact rate formerly agreed upon by the dental committee as a just rate.

The second volume of the Dental Index, for the years 1916-1920, has been published during the past year. The third volume to cover the years 1839 to 1880 is practically finished and should be ready by December, 1922.

A resolution was passed that the moral force of the association be brought to bear and that a movement be started to bring about universal reciprocity.

The Relief Fund Committee reported that a crisis had arisen in their work in-

asmuch as the association for the prevention of tuberculosis had taken exception to the method of raising money by the sale of Christmas seals as it was an infringment upon a method which had been original with them. There are about 16 organizations using this method and the reply which will be made will be to the effect that the dental association is willing to discontinue the method as soon as all other organizations are willing to do likewise.

It was regrettable to learn that although 35,000 packages of Christmas seals were sent out last year, only $12,000 was realized. And of those not caring to take part in this great movement only a few even took the trouble to send back the seals. The fund is nearing the $100,000 mark at which time it will begin to function. The sale of the seals will be continued this year and a special effort will be made to reach the $100,000 goal. We ask each member that when the package of seals comes to your desk this coming Christmas time that you will not put it aside but will immediately send in your check for $1.00. If it were an appeal by some fake organization for some foolish cause you would have just cause to throw it in your waste basket but when it is for such a good cause as a relief fund for disabled men of our own profession and this fund to be handled by such efficient men as have it in charge—think twice before you turn it down.

Cleveland will be the meeting place of the Association in 1923. Invitations were received from Dallas, Texas, and from Detroit, Michigan, for 1924.

The election of the president-elect was one of the closest that has ever been staged in the House of Delegates. Dr. Wm. Giffen, of Detroit, Michigan, and Dr. Clarence Grieves, of Baltimore, were the candidates and when the votes were counted it was found that Dr. Giffen had received 79 votes and Dr. Grieves 76 and Dr. Giffen was declared elected. Dr. Otto U. King was unanimously re-elected secretary.

A report would not be complete if mention was not made of the entertainment of the lady visitors. The California boys were royal entertainers. Every afternoon an automobile trip was given the ladies to points of interest. Beautiful homes, majestic palms, orange groves, movie studios, mountain drives, bathing beaches, old missions—all will go to form a delightful picture of remembrance.

The big social event of the meeting was the barbecue and rodeo at the Hollywood Bowl on Thursday afternoon and evening. Tom Mix of movie fame, and his cowboys, staged the rodeo; roping, riding, and all the stunts of an old-fashioned rodeo were on the program. Another feature was the barbecue of more than 2000 pounds of beef and mutton. A Spanish orchestra in the native costume of old Madrid played and Spanish dances were given. The Philharmonic orchestra gave a concert during the evening. Stunt flying by an aviator and a fine display of aerial fireworks completed the evening's entertainment. An entertainment of this type for such a large number of people entails a vast amount of work and the committee in charge deserves a lot of commendation and credit.

It is impossible to go into detail about the clinics, the exhibits, and many other things of interest. The sectional meetings were all that could be desired and one's only regret was that it was impossible to attend all the meetings at one time. It was a fine meeting and President Hartzell, Secretary King, and the Board of Trustees, and the various committees are to be congratulated.

CODIFICATION OF DENTAL HYGIENISTS' LAWS

	AGE	PRELIMINARY EDUCATION	COURSE OF STUDY	PROFESSIONAL TRAINING	EXAMIN. FEE	ANNUAL REGIS. FEE	LICENSED BY	LIMITATION OF PRACTICE	BY WHOM EMPLOYED	NUMBER OF HYGIENISTS ALLOWED IN PRIVATE OFFICES	REVOCATION OF LICENSE	RECIPROCITY	REGISTERED BY
ALA.	20 yrs.	Not specif.	Not specif	Not specif.	$10.00	$1.00	State Board of Dental Examiners	Removal of accretions, lime depos., and stains from exposed surf. of teeth	Schools, Hospitals Pub. institutions, Licensed Dentists	Not specif.	State Board of Dental Examiners	Not specif	State Board of Dental Examiners
ARK	20 yrs.	2 years high school	Determined by Board of Dental Examiners	Graduate of Training School—1 year course	25.00	1.00 (required but once)	State Board of Dental Examiners	Removal of accretions, lime depos., and stains from exposed surf. of teeth	Licensed Dentists	Not specif.	State Board of Dental Examiners	Not specif.	County Clerk
CALIF	18 ys.	None	Inorganic Chemistry, Physiology, Anatomy, Bacteriology, Anaesthesia, Radiography, Materia Medica, Dental Histol. Principles of Nursing and Hygiene, Practical demonstrations in Hygiene	Graduate of reputable training school	15.00	2.00	State Board of Dental Examiners	Removal of accretions, stains and deposits from exposed surfaces of teeth, under supervision of licensed dentists	Public institutions, schools and licensed dentists	No limit	State Board of Dental Examiners may revoke license for cause	With states having equal requirements	County Clerk
COL.	20 yrs.	Not specif.	Not specif	Graduation from training school	10.00	Not spec.	State Board	Removal of tartar, accretions & stains from exposed surfaces of teeth	Public schools, Pub. institutions Charitable inst., office licensed dentists	More than one	Not specif.		State Board
CONN.	Not spec.	No requirements	None required	None required	10.00	Not spec.	Recorder of Dental Commis.	Accretions, calc. depos., and stains from expos. surfaces of teeth	Licensed dentists, Public & Private inst. under superv. of lic. dentist	Not specif.	Dental Commission for cause	Equal requirements	Commis. & Board of Dental Examin.
IOWA	18 yrs.	2 years high school	Approved subjects	Graduate of school for dental hygienists—9 mos course	10.00	None spec.	State Board of Dental Examiners	Lime depos., accretions & stains from exposed surfaces of teeth	Dental off., Public or Priv. schools, Pub. instit.—superv. of dentists	Not specif.	For cause	Not specif.	State Board of Dental Examin.
MAINE	18 yrs.	1 year high school	Gen. Anatomy, Physiology, Bacteriology, Gen. Chemistry, Sterilization, Dental Prophylaxis, Dental Pathology	Graduate of training school for hygienists, or 6 months training as dental hyg in licensed dentist's off.	10.00	Not spec	State Board of Dental Examiners	Removal of lime depos., accretions & stains from expos. surf. of teeth	Licensed dentists, Public & Private inst. under superv. of lic. dentist	Not specif.	State Board of Dental Examin.	Option of Board of Examin.	State Board of Dental Examin
MASS.	20 yrs.	No requirements	At option of Board	Graduate of school for dental hygienists—1 year course	10.00	None spec.	State Board of Dental Examiners	Lime depos., accretions & stains from expos. surf of teeth	Public or priv schools, Dent. office, institutions—superv dent.	Not specif.	For cause	Not specif	State Board of Dental Examin.
MICH	Not specif	Graduate of credited high school	Not specif	Diploma from reputable school of Dental Hyg Course-9 mos.	15.00	.50	State Board of Dental Examiners	Lime depos., accretions & stains from expos. surf of teeth, & apply mouth wash	Dental off., or municipal inst., Pub schools or under Board of Health under superv of dentists	Not specif		Not specif	County Clerk
MINN	20 yrs	High school education—4 years	At option of Board	Graduate of training school for Dental Hygienists—Course-2 yrs	10.00	1.00	State Board of Dental Examiners	Lime depos., accretions & stains from expos. surf of teeth, administ. gas, ether & anaesthesia as applied to dentistry	Licensed dentists, Public institutions or schools under direc licensed dentists	Not specif	For cause by State Board of Dental Examin	Not specif	State Board of Dental Examin
MISS	20 yrs	Not specif	Determined by Board of Dental Examin	Graduate of school for hygienists,	25.00	Not spec.	Board of Dental Examiners	Removal of lime depos., accretions & stains from expos. surf of teeth	Licensed dentists & State Board of Health		State Board of Dental Examin	States of equal requirments	Clerk of the Circuit Court of the County

	AGE	PRELIMINARY EDUCATION	COURSE OF STUDY	PROFESSIONAL TRAINING	EXAMIN FEE	ANNUAL REGIS FEE	LICENSED BY	LIMITATION OF PRACTICE	BY WHOM EMPLOYED	NUMBER OF HYGIENISTS ALLOWED IN PRIVATE OFFICES	REVOCATION OF LICENSE	RECIPROCITY	REGISTERED BY
N Y	20 yrs	1 year high school	Anatomy, Physiology Nutrition, Preven Dentis., Materia Medica, Hygiene, Pathology, Bacteriology	Attendance at reputable training school for 1 year	5.00	1.00	Board of Regents	Lime depos., accretions & stains from expos. surf of teeth	Licensed dentists, Pub. inst., school authorities under supervision of licensed dentists	No provision	Regents may revoke license	Equal requirements	Board of Regents
OHIO	18 yrs	4 years high school	Option of State Board	Graduate of reputable training school for Dental Hygienists Course 8 mos.	10.00	1.00	State Board	Calcareous deposits, accretions & stains from exposed surfaces of teeth	Dental off., Public or Priv schools, Hospitals, Pub. inst., under superv licens. dentist	One for each dentist	State Board	With states having equal requirements	State, Board of Dental Examin.
OKLA	18 yrs.	None specif	None specif	Graduate of a reputable training school	10.00	Not spec.	State Board	Lime depos., accretions & stains from expos. surf. of teeth	Office of licensed or reg. dentist	Not specif.	Not specif	Not specif	State Board
PA	19 yrs.	4 years high school	Subjects approved by Dental Council	Graduate of training school for Dental Hyg. Course 8 mos.	10.00	Not spec	Dental Council examin. by Board of Dent. Ex.	Tartar accre. & stains from expos. surf. of teeth	Dental off. Pub. & Priv inst. under superv lic. dentist	Not specif.	Dental Council	Equal requirements	State Board of Dental Examin. (See Pa. law)
VT	21 yrs.	Not specified	Determined by State Board of Dental exam.	Graduate of training school for Dental Hyg. 1 academic year	10.00	Not spec	State Board of Dental Examiners	Removal of lime deposits accretions & stains from expos. surf. of teeth	Licen. dent. Pub. or priv. schools, Pub. instit. under superv of licen. dent.		Board of Dental Examiners	States of equal requirements	State Board of Dental Examin.
WASH	20 yrs.	4 years high school or its equivalent	Not specif.	Graduate of school for hygienist 1 yr course or accredited training school for nurses plus 3 mos. training in dental hygiene	10.00	Not spec.	Board of Dental Examiners	Removal of lime depos., accretions & stains from expos. surf. of teeth	Licen. dent., Pub. inst. or school authorities		Board of Dental Examiners	Not specif.	State Board
W VA.	18 yrs.	Graduate of high school	Anatomy, Physiology, Dental Histology, Bacteriology, Sterilization Dental Caries, Malocclusion, Oral Prophylax. Practical exam.	Graduate of a training school	10.00	No provision	Board of Dental Examin.	Lime depos., accretions & stains from expos. surf. of teeth, post-operative treatment & prophy. treatm. of teeth & gums	Licens. dent. (Industrial school, State Inst.) clinics under superv. of a licensed dentist	No provision	State Board of Dental Examin.	Equal requirements	State Board of Dental Examin.
WIS.	20 yrs.	2 years beyond the 8th grade	Anatomy, Physiology, Bacteriology, Histology, Pathology, Preventive Dentistry, Practical demonstrations in dental hygiene	Graduate of a reputable training school 8 months' course	10.00	1.00	State Board of Dental Examin.	Removal of stains & deposits from expos. surf. of teeth, and prescribe mouth washes	Public & private institutions under superv. of licensed dentist, also in private dentist off	Only one hygienist for each licensed dentist	State Board of Dental Examin. may revoke license for cause	Equal requirements	State Board of Dental Examin.
TENN.	State hygienist provided by law with authority to appoint one assistant without pay, at each county seat												

DRAFT OF LAW REGULATING PRACTICE OF DENTAL HYGIENE*

An Act

Providing for the examination and certification of dental hygienists and regulating the practice of dental hygiene. Be it enacted by the Legislature of the state of .....

*Approved by the House of Delegates at its 64th Annual Session at Los Angeles as a model bill for adoption by states not already having legislation on this subject.

Section I.—1. No person shall engage in practice as a dental hygienist without a certificate therefor issued by (here insert the official title of the Board or Commission issuing license to dentists), which shall authorize such person to remove calcareous deposits, secretions and stains from the exposed surfaces of teeth, and to prescribe and apply any ordinary wash or washes of

a soothing character, but not to perform any operation on the teeth or other tissues of the oral cavity.

2. Such certificate shall be issued upon written examination conducted by and satisfactory to (here insert the official name of proper examining board) which shall include the subjects of anatomy, histology, physiology, bacteriology, dental pathology and preventive dentistry. The examination shall also include practical demonstrations in dental hygiene.

Any applicant having reached the age of nineteen years shall be eligible to such an examination upon filing with (here insert the name of the recording officer of the examining board) credentials proving to the satisfaction of the examining board that such applicant has a general education equivalent to at least a one-year course beyond that of the eighth grade of the elementary school, and that such applicant is a graduate of a reputable training school for dental hygienists having a course of not less than thirty-two weeks. The examining board shall by regulation determine what shall constitute a reputable training school for dental hygienists.

3. At the time of applying for such examination the applicant shall pay an examination fee of ten dollars. Any applicant failing to pass in such examination may be re-examined within one year upon payment of an additional fee of one dollar. Any person to whom a certificate is issued pursuant to the provisions of this act shall register with (here insert the name of the official with whom licensed dentists are registered), and pay to him a registration fee of $1.00 on or before the next succeeding day of ....., and annually thereafter. (Regulation for registration as to fees and dates and place of registration conformable with other state laws should be provided.)

4. Such certified dental hygienists may be employed by boards of education of public or private schools, county boards, boards of health, or public or charitable institutions operating only under the general provision of one or more licensed dentists, and may also be employed in any dental office subject to such regulations as shall be prescribed by the examining board in the enforcement of the provisions of this section, provided that the number so employed in any dental office shall not exceed in number the number of licensed dentists operating therein, and they may also, under the direction and supervision of licensed dentists, act as assistant instructors in a school for the training of dental hygienists. Such certified dental hygienists shall not otherwise engage in practice as dental hygienists.

5. The examining board may revoke the certificate of any dental hygienist for any violation of this section. The license of any dentist who shall permit any dental hygienist operating under his supervision to violate this section, shall be revoked in the manner described in (here insert reference to proper sections providing for the revocation of dentists' licenses.)

6. Whenever any other state requiring a preliminary education of dental hygienists equal to that required in (here insert the name of the enacting state) shall grant to the dental hygienist of his state the reciprocal privilege of practicing as dental hygienists, the examining board of this state shall, upon the payment of the fee provided in subsection 3, issue a certificate to any applicant who shall upon examination furnish satisfactory proof that he has been duly licensed and lawfully and reputably engaged in practice as a dental hygienist in such other state for at least two years next preceding such application.

SECTION II.—This act shall take effect upon passage and publication.

Reminiscences of Forty-five Years in Dentistry

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D., Chicago, Illinois

X

ONE of the most picturesque figures I have ever known in the dental profession was the late Dr. W. G. A. Bonwill of Philadelphia. He was a man of towering genius, and was endowed with certain of the idiosyncrasies which are supposed to accompany genius. I had met him only a few times, but I knew him so well by reputation that on the occasion of a visit he was making to Chicago I felt, in common with others, that he should be shown some courtesy. So we invited him to a luncheon, and of course we asked him to speak. To the amusement of those of us who knew him, and the embarrassment of those who did not, he launched out at us with unstinted criticism for not having previously invited him to Chicago. Said he: "I have had invitations to speak in all parts of the world—even as far away as Moscow—but this is the first time you have ever invited me to Chicago." And he made no effort to disguise his resentment.

I sought to make amends by inviting him to take luncheon with me the following day, and stipulated one o'clock as the hour. Promptly at 12:15 he entered my office, just as I was beginning a gold foil operation in an upper molar. I had the rubber-dam on, the cavity prepared, and was about to insert the first pieces of gold. I knew the utter futility of trying to keep him in the reception room till the filling was inserted, and yet I was disinclined to have my patient annoyed by what I knew would be a running fire of comment on his part if I admitted him to the operating room. I explained the situation to my patient and asked permission to invite him in, at the same time telling her not to pay attention to anything he might say. He was quite deaf and had to use a speaking trumpet. I went out in the reception room and told him I was about to insert a foil filling, and that I should be glad to have him watch me provided he would not talk during the operation—that he might make all the notes he wished and ask any questions after the patient had gone. "All right," said he, "I won't utter a syllable." When he looked at the cavity he remarked, "I see you don't drill undercuts or pits." I merely shook my head, and I have never known whether or not he approved of my cavity preparation. When I began inserting the gold, he picked up one of the pluggers and said: "You don't use smooth points." It happened to be his hobby at that time to employ points without serrations. I shook my head, made no comment, and went on inserting the gold. The better that gold worked the more settled he became. Finally, I began using a rapid mechanical mallet to hasten the operation, and crime of crimes, it did not happen to be the Bonwill mallet. Nothing about that operation pleased him, and yet the gold persisted in work-

ing beautifully. He kept up a perpetual bombardment of criticism till the gold was condensed, all the while increasing in his disapproval.

I started to finish the filling when suddenly he burst out with the remark: "Did you take an articulation of the opposing teeth so you would know how far to build and finish the filling?" I admitted that I did not. "Then you are working an imposition on your patient, because you will grind too little or too much." I ventured the remark that I thought I knew about how far to grind. "Can't do it," he snapped out. "No man can tell without an articulating model." Evidently he thought he had me at a disadvantage this time, and he rode the idea with persistence.

When the filling was finished, and the rubber-dam removed, I asked the patient to close the teeth, and *there was no opposing tooth to meet this one!!* Dr. Bonwill forgot that he was in the presence of a lady and swore. I have seldom seen a man more crestfallen or indignant than he; and frankly I have been rather ashamed of that procedure ever since. But I admit that the temptation to catch him at his own game was very great. On the way to lunch he was taciturn and non-committal. As we sat at the table he turned suddenly and said: "You were thirty minutes inserting that filling, weren't you?" I said I had not timed myself, and did not know. "Well, you were," he remarked. "I could have put it in in *eighteen.*"

Dr. Bonwill never forgave me for that incident, and I confess that it was a very ungracious thing for me to do. He never lost an opportunity to criticize me in public, and I paid dearly for the joke I played on him that day. Dear, unique, eccentric, and lovable genius—he towered above most of the profession intellectually, and left an impress on the scientific phase of dentistry that is felt to this day wherever men think along fundamental lines. His name will live longer in our literature than most men of his day and generation.

The profession has had its full share of original characters, men whose individuality stamped them as unique among their fellowmen. One of these was the late Dr. French, of Rochester, New York, who was prone, on occasion, to give vent to his feelings in no uncertain tone. It is related of him that at one time when he was struggling with the problem—than which there is nothing more difficult in dentistry—of cleaning a torturous pulp canal, the broach broke in the canal. The patient was a lady but this made little difference to Dr. French. Instantly the air was blue with profanity. The lady who knew him well was amused rather than shocked, but said: "Tut-tut, Doctor, do you know where people go who use such language as that?" "Madam," he said, "I would rather shovel coal in hell, than to fill pulp canals in Heaven." And I am not sure that many of us disagree with him after working for a time on a difficult canal.

The late Dr. James A. Swasey of Chicago was another original character, and his repartee will live among his friends as a sweet savor of a very delightful personality. On one occasion some of the New York dentists were visiting Chicago, and expressed a wish to see the stockyards. Dr. Swasey was one of the escorts, and it was probably his first visit there. Curiously enough many people who come to Chicago from other cities wish to see the stockyards, when as a matter of fact it is the rarest thing that a Chicago resident ever thinks of going. After inspecting the yards the party went to the hotel for lunch, and as they were in the wash room one of the New York men remarked: "Well, Chicago is the greatest place for *hogs* that I have ever seen." Instantly Dr. Swasey's resentment arose against what he interpreted as a reflection on Chicago, and quick as a flash he said: "Yes—but by Godfrey, we *kill* 'em, here!"

Another Chicago man of marked in-

dividuality was the late Dr. J. N. Crouse. He was a powerful force in his day, and the profession owes him much for his constructive work during some very critical periods. When enlisted in any cause which appealed to his convictions, he was aggressive in the extreme, and no one had any difficulty in knowing precisely where he stood. He organized the Dental Protective Association, and one of the first cases with which he came in conflict was that of the International Tooth Crown Company. Some one said to him one day: "You can never fight that crowd." "Fight 'em!" he snapped, "I'll fight 'em till hell freezes over, and then by—— I'll fight 'em on the ice." And this was only typical of his temperament. He and I had some royal old battles in the early days over methods of practice, but we remained good personal friends; and I learned in his later years to know that there were two distinct sides to Dr. Crouse—the one which he blazoned before the world as an aggressive fighter, and the one in his family circle where he was tender and compassionate as a child. We often see that order reversed, wherein a man is suave and considerate in public, but perverse and disagreeable in his home. I think I like Dr. Crouse's temperament better.

The late Dr. George W. Cook of Chicago was another man of outstanding personality. He was so playful in disposition that few men knew the depth of his insight into scientific matters. In fact Dr. Cook was far in advance of his generation in many of his ideas, and the world of dentistry lost a luminous light when he passed away. In his absorption over scientific matters he at times became very absent-minded. He was in the habit of taking his breakfast at a certain restaurant, and one morning he went in and ordered it as usual. He became absorbed in something in the morning paper, and as he was leaving the restaurant the waiter said: "Doctor, aren't you forgetting something?" Dr. Cook glanced at the paper in his hand and said: "No, I brought my paper with me." "But," remarked the waiter, "you have forgotten to eat your breakfast." And there lay the untouched breakfast on the table. Dear George Cook, generous, spontaneous and lovable—his Chicago friends miss him to this day, although he has been gone for many years.

The late Dr. W. C. Barrett of Buffalo was a man of commanding presence, and great intellect, but there was one thing Dr. Barrett could not do and that was to draw an acceptable picture on a blackboard before a class of students. On one occasion he attempted to make a drawing of a tooth, and the result was so grotesque that he saw the discrepancy himself. Turning to the class he said: "Well—I never *have* been able to draw since I was weaned."

Individual pecularities are not confined to members of the profession, but are sometimes encountered among our patients. Years ago I had a lady who was so sensitive about her artificial teeth that she sedulously kept the fact that she wore them, even from the members of her family. She lived in a distant city, and when anything went wrong with her teeth she would make some excuse to come to Chicago, and would remain till they were repaired. On one occasion she looked up at me in the greatest seriousness and said: "Doctor, there is something that has been worrying me of late. I have been thinking that some day I may get appendicitis, and it may become so bad that I shall be obliged to have an operation, and if I do I shall have to take an anesthetic, and then *the surgeon will find out that I have artificial teeth!* Apparently she had no dread whatever of the operation, and an anesthetic was a mere trifle, but the thought that her artificial teeth should be discovered was a terrible calamity. I looked at her incredulously for a moment, and when I saw how seriously in earnest she was I nearly exploded with laughter at the absurdity of it. "You may laugh," she said, "but that to me is one of the most

terrible things that could happen." This poor woman was always in trouble trying to hide the fact that she wore artificial teeth. On one occasion she was visiting in another city and met a dentist socially. In the course of conversation he chanced to ask who her dentist was. When she informed him that I was her dentist he said: "I am so glad to hear that, and I am going to ask a favor of you. I have heard of Dr. Johnson's gold foil fillings, and I should like to have the privilege of looking into your mouth, and examining some of his work." When she recited the story to me afterward I asked her what she did. "Oh, doctor," she said, "I *lied* to that man—I told him all sorts of things—but I never let him look in my mouth."

Of course, it is quite impossible not to smile at this dear woman's obsession, and yet I am wondering if we should not have more consideration than we do for the point of view of others. Each of us has his own peculiarity, his own whim, and so long as it works no hardship on others why should we not be permitted to indulge it? The longer I live the more I am impressed with the fact that in our association with our fellowman we should have a larger and larger charity for what we are pleased to call the idiosyncrasies of those with whom we come in contact. The attempt to dominate the ideas of others has led to much inharmony in the world, even to the extent in some instances of causing war between nations. Let us not set ourselves up as a monitor or dictator to our fellows, and we shall leave more oil in the machinery of life, and accomplish greater good.

How easily a dentist may be put in a false light before a fellow-practitioner is well illustrated by an incident which happened to me some years ago. A lady came to me as a patient whose teeth had been very indifferently cared for by her previous dentist. In fact the work was a sad commentary on the ability of the man who performed it, and yet it was for the most part saving the teeth, and I of course made no comment on it, and did only a very little work for her.

Shortly after this she left Chicago to spend the winter, and on her return in the spring she came to me with the following story: "I had occasion to consult a dentist while away and I went to a man who knew you quite well by reputation, and had read some of your books. When he learned that I was your patient he seemed delighted, and said he was anxious to see some of your operations." I said: "You surely did not permit him to have the impression that I had done all the work in your mouth!" "Yes, I did," she answered frankly. "He seemed so very enthusiastic over seeing some of your work that I didn't have the heart to tell him." I have often wondered what that man really thought of me. One thing—it made me resolve that I would be extremely careful about passing judgment on any man in the future.

(*To be continued*)

CODE OF ETHICS OF THE AMERICAN DENTAL ASSOCIATION*

SECTION 1. In his dealings with patients and with the profession, the conduct of the dentist should be in accordance with the Golden Rule, both in its letter and in its spirit.

Section 2. It is unprofessional for a dentist to advertise by handbills, posters, circulars, cards, signs, or in newspapers or other publications, calling attention to special methods of practice or claiming excellence over other practitioners, or to use display advertisements of any kind. It is also unprofessional to publish reports of cases on certificates in the public prints. This does not exclude a practitioner from using professional cards of suitable size with name, titles, address and telephone number, printed in modest type, nor having the same character of card in a newspaper. Neither does it prevent a practitioner who confines himself to a specialty from merely announcing his specialty on his professional card.

Section 3. It is unprofessional for dentists to pay or accept commissions on fees for professional services, or for radiograms, or on prescriptions or other articles supplied to patients by pharmacists or others.

Section 4. One dentist should not disparage the services of another to a patient. Criticism of operations which are apparently defective may be unjust through lack of knowledge of the conditions under which they were performed. But the welfare of the patient is paramount to every other consideration, and should be conserved to the utmost of the practitioner's ability. If he finds indisputable evidence that a patient is suffering from previous faulty treatment, it is his duty to institute correct treatment at once, doing it with as little comment as possible and in such a manner as to avoid reflection on his predecessor.

Section 5. If a dentist is consulted in an emergency by the patient of another practitioner who is temporarily absent from his office, or by a patient who is away from home, the duty of the dentist so consulted is to relieve the patient of any immediate disability by temporary service only, and then refer the patient back to the regular dentist.

Section 6. When a dentist is called in consultation by a fellow practitioner, he should hold the discussions in the consultation as confidential, and under no circumstances should he accept charge of the case without the request of the dentist who has been attending it.

Section 7. The dentist should be morally, mentally and physically clean. He should be honest in all his dealings with his fellow man, as comports with the honor and dignity of a cultured and professional gentleman.

*New Code of Ethics of the American Dental Association adopted at the Los Angeles session.

THE JOURNAL of the AMERICAN DENTAL ASSOCIATION

Entered as second-class matter, March 22, 1915, at the Post Office at Huntington, Indiana, under the Act of August 24, 1912. Published Monthly.

Editor and General Manager,
OTTO U. KING, D.D.S., F.A.C.D., 5 N. Wabash Ave., Chicago, Illinois.
Associate Editors,
THOMAS P. HINMAN, D.D.S., F.A.C.D., Atlanta, Ga.
HARVEY J. BURKHART, D.D.S., LL.D., F.A.C.D., Rochester, N. Y.
THOMAS B. HARTZELL, D.M.D., M.D., F.A.C.D., Minneapolis, Minn.

All expressions of opinion and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by vote of the Association.

MANUSCRIPTS: Manuscripts should be typewritten, double-spaced, and the original, not the carbon copy, submitted. We cannot promise to return unused manuscript and used manuscript is not returned. Requests for reprints should be made at the time of forwarding article. We reserve the right to accept or reject any manuscript for publication. Articles are accepted for publication on condition that they are contributed solely to this journal.

SUBSCRIPTION included in the annual membership dues.

SUBSCRIPTION, $2.00 a year, in advance, to non-members, living in all parts of the United States or its possessions. Canada, $3.00. Foreign countries, $3.00. Single copies, 25 cents.

ADVERTISEMENTS accepted only from reliable firms. Fraudulent and misleading advertisements barred.

IN CHANGES of ADDRESS both the old and new address must be given.

JOURNALS are not sent beyond the subscription period.

VOL. 9 OCTOBER, 1922 NO. 10

Editorial Department

WHAT ABOUT FEE-SPLITTING?

The time has arrived when the profession from one side of the land to the other must take a firm stand on this matter of splitting fees. It is doubtful if every member of the House of Delegates at the recent meeting of the American Dental Association at Los Angeles who voted so unanimously for the adoption of the new Code of Ethics realized to the fullest extent the significance of the step that was being taken at that time. As was stated in our last issue there was one

provision in that code which contained a sweeping prohibition of the practice of paying or receiving commissions. The members who voted on this particular provision must at least have done so with their eyes open, because especial attention was called to it by the Judicial Council in the report containing the proposed code; and it now remains for the officers of the various component societies throughout the country to see that this enactment is enforced.

Let us analyze for a moment the situation which made it necessary to introduce such a section in the dental code. When dentistry first began to take form as a distinct calling it was customary for the practitioner to include all the various phases of the profession in his daily work. In fact there were not so very many phases to be included, and a man could well cover the entire field as the science of dentistry was then understood. But as the profession began to broaden, and the various technical procedures became more refined and the manifestations of disease better understood, it came to the point where one man could not well master the details of every department of the work. As was perfectly natural under the circumstances, some men became specially interested in certain parts of the practice of dentistry, and finally they began one after another to announce that they would confine their activities to the one particular field which most appealed to them. Thus specialties were born. In the main they have been of great value in developing better dentistry, and have tended, through the concentration of study given them, to bring about a higher class of practice in the profession. But in the nature of things specialists depended largely for their patronage on the general practitioner. It was through patients referred by him that most specialists built their practice, and in the early days of specialization some specialists, not fully realizing the ethical discrepancy involved in the transaction, offered as an inducement for referring patients a commission on the fees obtained from every patient so referred.

When this practice was analyzed it was, of course, manifest that it was ethically and morally wrong, and the better men of the profession began a crusade against it. As specialization grew the question of fee-splitting became more and more acute, until some of our dental societies, recognizing the danger to our professional integrity introduced a provision in their Code of Ethics, prohibiting the paying or receiving of commissions. In 1909 the Illinois State Dental Society adopted a code containing such a provision, and it has been operating under it ever since. It is probably true that in line with the general

trend toward commercialism which has been manifest in all callings in our recent unsettled years, this provision has frequently been violated, but that it has had a deterrent effect on the evil there can be no doubt.

For some reason our great national body has not till now grappled with this question, but at the Los Angeles meeting it placed itself squarely on record in terms that cannot be misconstrued. Henceforth every member of the American Dental Association who pays or receives commissions on fees for referred patients is violating one of its specific regulations and may be expelled from membership.

An analysis of the practice of paying commissions shows it to be untenable from every possible point of ethical consideration. If a general practitioner sends a patient to a specialist he does it because he either does not care to perform this particular service, or he feels that he is not competent to perform it. In either case it is an accommodation to him to have a specialist who will assume the responsibility of caring for the patient. Specialists have really been a great source of comfort and satisfaction to the general practitioner, and have relieved him of much irksome effort. Why then capitalize the situation and introduce bribery into the transaction to the outrageous injustice inflicted on the patient? When the general practitioner accepts a commission, he is receiving money for which he has given no service, and to receive something for nothing is demoralizing and disintegrating in every way. Aside from the manifest injustice to the patient, the practice of fee-splitting, or in plain terms of grafting, is doing a definite harm to the man who indulges in it, and it will sooner or later lead to his undoing. It is wrong in principle, pernicious in practice, and it must be stamped out of our professional activities.

There are many evils connected with this practice, aside from the moral wrong to the patient, which makes it more and more a stench in the nostrils of all decent professional men. A man who will accept graft of this kind will soon have his moral senses so blunted that he will not scruple to send patients for services for which they are not really in need, and this very thing is by no means a unique experience in our modern methods. The good name and fair reputation of our profession is at stake, and the practice of fee-splitting must be rigidly stamped out if we are to maintain our status as true professional men before the world.

We strongly urge a careful study of the new Code of Ethics found on page 908 of this issue of the *Journal.*

WALDO ELIAS BOARDMAN

By HARVEY J. BURKHART, D.D.S., LL.D., F.A.C.D., Rochester, New York

Dr. Waldo Elias Boardman, who died at the Nebraska Methodist Hospital, Omaha, Nebraska, August 14, 1922, when returning from the meeting of the American Dental Association, held at Los Angeles, California, was born in Saco, Maine, September 1, 1851. He descended originally from the Boardman family of Cambridge, England, who settled in Cambridge, Massachusetts, in 1600. On his mother's side, Dr. Boardman descended from Captain Jonathan Poole, a noted Indian fighter.

Dr. Boardman received his early education in the public schools of his native city and in the Bryant and Stratton Business College at Portland, Maine. He first engaged in the boot and shoe business with his father in Saco, in 1869. In 1871 he came to Boston and was a patent solicitor in connection with patent cases for nearly seven years, when his health failed owing to overwork. After some years' rest, he engaged in the newspaper business in New York City and the publication of a weekly trade journal devoted to the cotton belt. After a year's experience in the newspaper business, he entered the dental department of Harvard University in 1883, and after completing a three-years' course, was graduated from that institution June 29, 1886. He at once became an instructor in operative dentistry and filled that position for ten years. He also became a member of the administrative board of the dental college in 1889.

Dr. Boardman's practice was confined to Boston, except for a time in Bristol, England, in 1899. He was curator of the dental museum of Harvard University from 1899 until the time of his death, and from a small nucleus built up a library of over three thousand volumes.

Dr. Boardman held practically every office in the gift of the members of the various dental organizations in Boston and Massachusetts. No man in the history of dentistry in Massachusetts has been as active as was Dr. Boardman, or has carried the burden of the executive business of the various societies so many years, or filled the positions as acceptably as did he. He was a member of the organizing committee of the Fourth International Dental Congress held in St. Louis in 1904; president of the National Dental Association in 1904-5; a member of the International Dental Federation, and various other dental organizations. He was a member of the Boston Art Club, the City Club of Boston, and a life member of the Massachusetts Sons of the American Revolution. He was a member of the board of managers of the last named organization for some years, and a delegate at national meetings of these organizations.

Dr. Boardman was a frequent contributor to dental periodicals and read many papers before dental societies. There is probably no member of the profession, in recent years, who has devoted so much of his time to the management of dental society affairs as did he. For over twenty years he was a member of the executive council and a trustee of the National Dental Association, and at the recent Los Angeles meeting he was elected a trustee of the American Dental Association for three years.

No man could have been more faithful and loyal to the interests of his profession than was Dr. Boardman. He ranked high as a business man and had executive ability of a very high order, which was freely given for the benefit of the organ-

izations with which he was connected. He was a man of high-toned and splendid ideals and was always ready to do his utmost for the uplifting and advancement of his profession. He was true, honest, loyal and conscientious, and his word was as good as any man's bond. He was always frank and open in the consideration and discussion of any question and endeavored to work for the best interests of his profession. He was many times plain spoken and direct in his conversation, but always tried to put aside personal consideration in the discussion of the various questions that came up for decision. He was of a most kindly and generous nature and a fine companionable fellow.

There are few men in the profession who enjoyed as wide an acquaintance as did Dr. Boardman, or who had so many loyal and devoted friends. He will be greatly missed by the members of the various organizations to which he belonged, and nowhere more than in the dental societies in his own state where he gave so much of his time and his substance. The dental profession everywhere is indebted to him and his passing away will bring regret and sorrow to his friends throughout the world.

ANNUAL INDEX OF PERIODICAL LITERATURE, 1921

381 Linwood Ave., Buffalo, N. Y.
September 7, 1922.

Dr. Otto U. King, Editor,
Journal of the American Dental Association,
5 N. Wabash Ave., Chicago, Ill.

Dear Doctor King:

Under another cover I am sending a copy of the 1921 Annual Index of Periodical Dental Literature which I trust will reach you safely and in time so that you may make a review announcement of its appearance, etc., etc., in the next issue of the *Journal*.

The price of the Annual Index delivered to points within the United States and Canada is $2.00 postpaid and to all foreign points $2.50 postpaid.

Your attention is called particularly to the statements on pages V and VI as to the mode of publishing these books for the next four years.

Please accept our thanks for the favorable mention you have given our efforts in the past and now thanking you in anticipation, I beg to remain,

Yours very truly,
(Signed) A. HOFFMAN, *Secretary-Treasurer.*

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Dental Association, September 10-14, 1923, Cleveland, Ohio.

American Public Health Association, October 16-19, Cleveland, Ohio.

STATE SOCIETIES

October

New England Dental Society, at Boston, Mass. (26, 27, 28).

Northern Illinois, at Rockford (18-19).

Susquehanna Dental Association of Pa., at Scranton (25, 26, 27).

Virginia, at Richmond (18-21).

November

Florida, at Jacksonville (9, 10, 11).

December

Ohio State Dental Society, Cincinnati (5, 6, 7).

February (1923)

Minnesota, at Minneapolis (6-8).

March

Michigan, at Detroit (27, 28, 29, 30, 31).

Vermont, at Burlington (14, 15, 16).

April

Alabama, at Birmingham (2nd Tuesday).

Kentucky, at Louisville (16, 17, 18, 19).

Kansas, at Wichita.

Mississippi, at Laurel.

Missouri, at St. Louis.

May

Illinois, at Decatur (8, 9, 10).

Indiana, at Indianapolis (14, 15, 16, 17).

Iowa, at Des Moines, (1, 2, 3).

Louisiana, at New Orleans.

Nebraska, at Omaha (21, 22, 23, 24).

New York, New York City (9, 10, 11, 12).

Pennsylvania, Philadelphia (8, 9, 10).

South Dakota, at Huron.

West Virginia, at Wheeling (21, 22, 23).

June

Idaho, at Boise.

New Hampshire, at The Weirs (21, 22).

Utah, at Salt Lake City.

Wyoming, at Loraine.

July

Montana, at Missoula.

Wisconsin, at Milwaukee (10, 11, 12).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

Connecticut, at Waterbury, November 23, 24 and 25. Arthur B. Holmes, Secretary, 63 Bank Street, Waterbury.

Indiana, at Indianapolis, November 6-11. H. C. McKittrick, Secretary, 1006 I. O. O. F. Building, Indianapolis.

Maryland, at College of Dental Surgery, Baltimore, November 7, 8 and 9. T. L. McCarriar, Secretary, 1822 N. Charles Street, Baltimore.

Michigan, at Dental College, Ann Arbor, November 13 to 18 inclusive. Secretary, E. O. Gillespie, 745 David Whitney Building, Detroit.

New Jersey, at Trenton, December 4 to 8, inclusive. Secretary, John C. Forsyth, 429 E. State St., Trenton.

TENNESSEE STATE DENTAL ASSOCIATION

The fifty-sixth annual meeting of the Tennessee State Dental Association will be held in Nashville, Tennessee, May 2, 3, 4, and 5, 1923, with headquarters at the Harmitage Hotel. A clinical and scientific program of unusual interest is being arranged.

O. A. OLIVER, *President*,
JOE MINOR, *Secretary*,
Nashville, Tenn.
J. W. WINN, *Chairman, Program Com.*,
Lambuth Bldg., Nashville, Tenn.

MINNESOTA STATE DENTAL ASSOCIATION

The fortieth annual meeting of the Minnesota State Dental Association will be held at the St. Paul Auditorium, Minneapolis, Minnesota, February 6, 7, and 8, 1923.

C. H. TURNQUIST, *Secretary,*
338 LaSalle Bldg., Minneapolis, Minn.

INDIANA STATE BOARD MEETING

The next meeting of the Indiana State Board of Dental Examiners will be held in Indianapolis, November 6-11. For further information and applications for examination write

H. C. MCKITTRICK, *Secretary,*
1006 I. O. O. F. Bldg., Indianapolis.

MARYLAND BOARD OF DENTAL EXAMINERS

The Maryland State Board of Dental Examiners will meet at the Baltimore College of Dental Surgery Tuesday, Wednesday and Thursday, November 7, 8 and 9, 1922, for the examination of applicants. For additional information, application blanks, etc., address

T. L. MCCARRIAR,
1822 N. Charles St., Baltimore, Md.

NEW JERSEY BOARD OF EXAMINERS

The State Board of Registration and Examination in dentistry of New Jersey will hold their regular examination at Trenton, New Jersey, December 4 to 8, 1922, inclusive. Examination fee $25.00; re-examination fee $10.00.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling and a silicate filling, candidate furnishing own patient; taking of impressions, bite, selection of teeth, articulation, trial plate, candidate furnishing patient as before; practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: * * * "Applicant shall present to said board a certificate from the Commissioner of Education of this state, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year high school course in an approved high school, or the equivalent thereof." In accordance with this law the secretary will issue application banks only upon presentation of the required certificate from the Commission of Education, State House, Trenton, New Jersey.

Application must be filed, complete on or before November 24, 1922. Address all communications for further particulars to

JOHN C. FORSYTH, *Secretary,*
429 East State St., Trenton, N. J.

CONNECTICUT DENTAL COMMISSION

The Connecticut Dental Commission will meet at Hartford, Connecticut, on November 23, 24 and 25, to examine applicants for license to practice dentistry and dental hygiene and to transact any other business proper to come before them. For further information apply to

ARTHUR B. HOLMES,
63 Bank St., Waterbury, Conn.

MARQUETTE UNIVERSITY DENTAL SCHOOL ALUMNI MEETING

The sixteenth annual meeting of the Marquette Dental Alumni Association will be held at the Auditorium, Milwaukee, Wisconsin, February 14, 15, and 16, 1923. All ethical members of the profession are cordially invited to attend.

G. W. WILSON, *Chairman of Exhibits,*
3401 Lisbon Ave., Milwaukee, Wis.
J. V. SENGPIEL, *Secretary,*
695 Astor St., Milwaukee, Wis.

AMERICAN ASSOCIATION OF ORAL AND PLASTIC SURGEONS

The second annual meeting of the American Association of Oral and Plastic Surgeons will be held in Boston at the Boston Medical Library, Friday and Saturday, October 20 and 21. An interesting program has been arranged and those interested in this field of surgery are cordially invited to be present.

TRUMAN W. BROPHY, *President,*
HENRY S. DUNNING, *Sec'y-Treas,*
33 E. 68th St., New York City.

THE FOURTH ANNUAL REPORT OF THE DEPARTMENT OF DENTAL HYGIENE

Jersey City, N. J.

To the President and Members of the Board of Education.

Gentlemen:

I hereby submit the fourth annual report of the Department of Dental Hygiene.

The following amount of work has been accomplished in the five dental clinics for the

children, from September 6, 1921, to June 28, 1922:

Total No.	of	children examined	7407
" "		receiving treatment	6392
" "		of fillings	2242
" "	"	treatments (medical)	1026
" "	"	extractions:	
		Permanent	892
		Temporary	4603
" "	"	prophylactic treatments	3207
" "	"	toothbrush drills	646
" "	"	home visits	1320
" "	"	cases completed or cured	1438
" "	"	X-Rays	10

Every effort is made by the dental nurses to present the subject of tooth brushing to the children in a way which will be educational and interesting, and this instruction is given in all the grades of the primary department; their dental examinations, however, are confined to children in Grades 3A and 3B. This plan has been adhered to for the reason that it is at this stage that decay of the first permanent molar teeth becomes apparent. These six-year molars are by far the most important teeth in the denture, and unless carefully safeguarded, are lost early in life. The dentists confine their efforts to the filling of the very first small cavities which appear in these teeth. The work is necessarily slow and tedious, as the children are small and require careful handling.

I am very grateful to the superintendent, principals, and teachers for their hearty co-operation in aiding me in every way in my work.

Respectfully submitted,

JOHN B. FARRELL, D.D.S.,
Director of Dental Hygiene.

AMERICAN DENTAL GOLF ASSOCIATION

The annual tournament of the American Dental Golf Association, which was held July 17 at the Los Angeles Country Club was the most successful event in the history of dental golf. Two hundred and eight players competed in the 36-hole medal play tournament and considering the fact that a great many of the players were not familiar with the two eighteen-hole courses, the scores which were turned in were remarkably good.

The officers and committeemen of the American Dental Golf Association aided by the local committee had worked out the details of the tournament so that there were no delays in starting and the foursomes got away with the regularity of clockwork. Great credit is due the Los Angeles Country Club for its co-operation in making the event a success. The management spared no effort to make the visitors comfortable and showed them every courtesy.

Preparations for this great dental golfing event began several months ago. In March the secretary of what was then the National Dental Golf Association, Dr. Ralston I. Lewis, issued an important letter and announcement regarding the golf tournament. In May the Journal of the National Dental Association devoted five pages to dental golf. The article by the president of the Dental Golf Association, Dr. Thomas P. Hinman, entitled, "Why I Play Golf" is a classic which every dentist should read.

The golfer's special which reached Los Angeles about one week before the tournament brought more than a score of enthusiastic golfers who lost no time in making their way to the links of the Los Angeles Country Club to try their skill on the two famous eighteen-hole courses. Guest cards were issued to all members of the Dental Golf Association permitting them to play at the following clubs: Annandale, Ambassador, Brentwood, California, Flintridge, Hacienda, Hollywood, Los Angeles, Pasadena, San Gabriel, Virginia and Wilshire. This gave the visitors ample opportunity to practice before the day of the great event.

On the day preceding the tournament motion pictures of the association members and individual pictures of some of the leading players were taken. These pictures were thrown on the screen during the annual golf dinner which was held at the Ambassador Hotel the same evening. About two hundred and fifty were present at the dinner and every one entered into the spirit of the occasion. Following the dinner short addresses were made by the retiring president, Dr. Hinman, and by Mr. Tufts, president of the Southern California Golf Association. It is to be regretted that no stenographic record of these addresses was made. They were snappy and well suited to the occasion and held the attention of an audience which was not inclined to take things seriously.

The Calcutta pool was one of the principal events on the program. Fifteen players were auctioned off to the highest bidder and at times there was considerable competition and the bidding quite "spirited." Dr. Charles M. Benbrook presided as auctioneer in his customary able and efficient manner, his familiar figure being admirably set off in a flaming red golf suit and cap.

Space will not permit a complete description of the tournament nor of the many details connected with it but everyone who was fortunate enough to be present knows what a wonderful day it was and no description of it is necessary. Golf seldom affects two persons in the same way. Each individual gets his own particular thrill or "kick" out of it. Only a few are able to turn in the low scores but every player cannot fail to benefit greatly by a day

or only part of a day of golf if he looks at it from the right point of view. Anyone who is dissatisfied with his game and is easily discouraged may read with profit the article in the July number of the *American Golfer* entitled "The Confessions of a Golf Failure." It is an unsigned article and may have been written by a dentist for all we know, but he is an optimist and philosopher whoever he is and knows how he can get the most out of a wonderful recreation. Some one has suggested as a fitting companion to the slogan "dentistry can add ten years to human life" the truism "golf can add ten years to a dentist's life." There are at least 400 members of the American Dental Golf Association who are willing to try the experiment.

The results of the tournament follow:

36 Holes

Players drawn in the Calcutta Pool: Dr. T. P. Hinman, Atlanta, Ga., 166; Dr. S. E. Watson, San Diego, Cal., 169; Dr. Frank Casto, Cleveland, O., 169; Dr. Charles Hartley, Los Angeles, 173; Dr. Fred Lush, Cincinnati, O., 166; Dr. Homer Humes, Los Angeles, 171; Dr. J. O. Hall, Waco, Tex., 171; Dr. Frank Warren, Los Angeles, 193; Dr. N. Burt, Los Angeles, 189; Dr. Lee K. Stewart, Pasadena, 168; Dr. H. Barlow, Sparta, Wis., 173; Dr. O. G. Pinkston, 181; Dr. Gardner, Memphis, Tenn., 180; Dr. W. H. Spinks, Los Angeles, 182; Dr. F. C. Jarvis, Oakland, Cal., 170.

Lowest Best Ball Scores

143 Gross: W. H. Spinks, L. K. Stewart, F. M. Casto, Fred Lush. 133 Net: H. C. Humes, S. E. Watson, W. H. Card, Chas. Hartley.

Dr. Hinman and Dr. Lush were tied for first place and on the play off Dr. Lush won, thereby making him the champion of the American Dental Golf Association.

The Prize Winners

Following is the prize, by whom donated, and the winner:

Allen table, Harvard Co., Canton, O., S. E. Watson.

Allen Table, Harvard Co., Canton, O., P. E. Zeiss.

$35 box Synthetic Porcelain, L. D. Caulk, Milford, Del., Fred Lush.

$10 box cement, L. D. Caulk, Milford, Del., L. W. Downs.

5 ounces T. C. alloy, L. D. Caulk, Milford, Del., M. G. Plank.

Drinking glass cabinet (12 glasses), American Cabinet Co., Two Rivers, Wis., W. H. Spinks.

Wax warmer, Heidbrink Co., Minneapolis, Chas. Hartley.

$50 Jelenko products, J. F. Jelenko Co., New York City, T. P. Hinman.

$10 package Goldsmith cement, Goldsmith Bros., Chicago, F. E. Roach.

Roach casting machine, Dental Products Co., Chicago, Ill., J. O. Hall.

Blairs "Surgery and Diseases of Mouth and Jaws," C. V. Mosby Co., St. Louis, Mo., E. R. Brownson.

Set of Ash's high fusing bodies, Claudius Ash & Sons, New York, Ralph Hartley.

X-ray diagnostic reader, Harry Boswor.h, Chicago, F. M. Casto.

$10 package oxyphosphate copper cement, W. V-B. Ames, Fremont, O., F. M. Taylor.

100 Trubyte crowns and 100 Trubyte crown posts, Dentists' Supply Co., New York, H. C. Humes.

2 dozen Prophylactic tooth powders, Prophylactic Tooth Powder Co., New York, O. G. Pinkston.

10 ounces Crandall alloy, Cleveland Dental Mfg. Co., Los Angeles Office, C. D. Quinn.

Peerless operating stand, Cleveland Dental Mfg., Cleveland, O., Chas. Hartley.

$50 Elgin outfit, Ransom & Randolph, Cleveland, O., S. E. Watson.

Gross burs, Ransom & Randolph, Cleveland, O., Lee K. Stewart.

Cabinet certified enamel, Lee Smith, Pittsburg, Pa., H. C. Humes.

Cup sterling silver, Shreve Co., San Francisco, W. H. Spinks.

Country Club Magazine subscriptions, Los Angeles, T. P. Hinman, R. I. Lewis, F. M. Casto, F. Lush, J. A. Loughry, Dr. James.

Merchandise, California Dental Supply, Los Angeles, N. W. Goodman.

Golf bag, C. M. Andrews, Los Angeles, E. J. Wylie.

Dozen golf balls, Pepsodent Co., Los Angeles, J. O. Hall.

One dozen bottles Borine, Borine Mfg. Co., New York, Dr. Konghman.

Dozen golf balls, Columbus Dental Mfg. Co., N. W. Goodman.

Dozen golf balls, Weber Dental Mfg. Co., Canton, O., F. M. Casto.

Merchandise, A. J. Brown, Los Angeles, A. E. Sykes.

Merchandise, J. A. Edwards Dental Supply, San Francisco, C. J. Jarvis.

Three boxes prunes, A. M. Barker, San Jose, Cal., F. M. Casto, T. P. Hinman, Fred Lush.

Dozen golf balls, Bullock's, Los Angeles, F. E. Roach.

One dozen Sodiphene, Sodiphene Co., Kansas City, Mo., W. H. Card.

One dozen Wilkinson's No. 8 gold, M. M. Wilkinson, Santa Monica, Cal., ———.

Pair Anatomik shoes, Gude's Inc., Los Angeles, W. C. Smith.

The election of officers for the ensuing year resulted as follows: President, Dr. Ralston I. Lewis, Chicago; vice-president, Dr. Fred Lush,

Cincinnati; secretary-treasurer, Dr. J. A. Loughry, Cleveland.

Dr. Wallace H. Spinks, who was unanimously elected president on the first ballot, declined to accept the honor and was accordingly elected honorary president in recognition of the service he has rendered to the association. Dr. Spinks was the originator of the first organization of dental golfers in southern California. The Southern California Dental Golf Club now has a membership of 141, the majority of whom are members of the American Dental Golf Association. One hundred and sixteen new members were added to the American Association this year.

The next tournament will be held in Cleveland in September, 1923.

P. B. WRIGHT,
Pasadena, Cal.

(Chairman Publicity Committee, Southern California Dental Golf Club.)

DENTAL CORPS ORDERS FROM WAR DEPARTMENT

ARMY

Lieutenant Colonel Harold O. Scott report to retiring board at Denver, Colo., for examination.

Major Charles C. Mann and Captain George J. Sibley having been found by Army retiring boards incapacitated for active service on account of disability incident thereto, their retirement from active service is announced; proceed home.

Captain Dell S. Gray from Fort Screven, Ga., to Fort McPherson, Ga., for observation and treatment at station hospital.

Major Samuel J. Randall from Fort Thomas, Ky., to Walter Reed General Hospital, D. C., for observation and treatment.—*Army and Navy Register,* August 26, 1922.

Colonel Edwin P. Tignor report to retiring board at Fort McPherson, Ga., for examination.

Colonel Alden Carpenter and Captain William E. Sankey report to retiring board at Washington for examination.

Major Lowell B. Wright from duty at Fort Hamilton, N. Y., to New York City and report to attending surgeon for duty in his office.

Major Earle J. McClung from assignment and duties in Alaska, effective upon completion of present tour of foreign service, and assigned to duty at Fort McDowell, Cal.

Major William D. White from duty at Fort McDowell, Cal., to duty in Alaska.

Captain Leslie S. Harlan report to retiring board at Fitzsimons General Hospital, Denver, Colo., for examination.—*Army and Navy Register,* September 2, 1922.

Major Benjamin C. Warfield report to retiring board at Boston for examination.

Major Neal A. Harper from duty in office of attending surgeon, New York City, to Boston for duty at headquarters 1st corps area.—*Army and Navy Register,* September 16, 1922.

NEW BOOK RECEIVED FOR THE LIBRARY OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

The Journal of the American Dental Association acknowledges here the receipt of the following new publication. A review is a matter-of-fact statement of the nature and contents of the publication referred to and is intended *solely to guide possible purchasers.*

"The Origin of Evolution of the Human Dentition," (A Palaeontological Review). William K. Gregory, A.M., Ph.D., (Columbia), Curator of the Department of Comparative Anatomy, American Museum of Natural History, New York; Associate Professor of Vertebrate Palaeontology, Columbia University. Published by Williams & Wilkins Company, Publishers of Scientific Journals and Books, Baltimore, U. S. A.

Contents: Part I. Traces the stages of ascent from the Silurian fishes to the mammals of the Age of Reptiles. Part II. Covers the stages from the Paleocene placental mammals to the lower primates. Part III. Describes Nature's earlier experiments in evolving large-eyed and short-jawed primates. Part IV. Discusses the dentition of the higher primates and their relationships with man. Part V. Treats the later phases in the evolution of the human denture; gives a conspectus of the species and the chief races of mankind, with special reference to dental characters; and concludes with a general summary of twenty-six structural stages in the ascent of man and in the evolution of the human dentition. Illustrated by 15 plates and 353 figures 6¾x9⅞, cloth, gold stamped, 548 pages, detailed index, full bibliography. Published May, 1922. United States, $6.50; Canada, $6.75; Foreign, $7.00. Prices are net, postpaid.

JOHN P. BUCKLEY, Ph.D., D.D.S., F.A.C.D., Los Angeles, California
President, American Dental Association